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SLAG DISPOSAL  
SITE INVESTIGATION  
AT  
ALGOMA STEEL CORP.,  
VOLUME II

MARCH 1992



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SLAG DISPOSAL SITE INVESTIGATION AT  
ALGOMA STEEL CORPORATION

VOLUME II

Report Prepared For:

Detroit/St. Clair/St. Mary's Rivers Projects - Southwest Region  
Ontario Ministry Of The Environment

Report Prepared By:

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Guelph, Ontario

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**APPENDIX 5**

**Water Level Data**

**WATER LEVEL DATA**

## Appendix 5: Water Level Data

|           | Activity -->         | Date -->     | + 880805/06<br>+ development |        | 880807<br>development |        | 880808<br>development |        | 880809/10<br>development/<br>sampling |        |        |
|-----------|----------------------|--------------|------------------------------|--------|-----------------------|--------|-----------------------|--------|---------------------------------------|--------|--------|
| Well ID   | Top Casing Elev. (m) | Stick up (m) | + Water Levels (mbtc)        | (masl) | Water Levels (mbtc)   | (masl) | Water Levels (mbtc)   | (masl) | Water Levels (mbtc)                   | (masl) |        |
| A1-1      | 193.32               | 0.94         | +                            |        |                       |        |                       |        |                                       |        |        |
| A1-2      | 193.30               | 0.90         | +                            |        |                       |        |                       |        |                                       |        |        |
| A2-1      | 193.62               | 0.92         | +                            |        | 5.800                 | 187.82 | 10.47                 | 183.15 | 7.310                                 | 186.31 |        |
| A2-2      | 193.46               | 0.78         | +                            |        | 6.465                 | 187.00 | 6.480                 | 186.98 | 6.420                                 | 187.04 |        |
| A3        | 186.45               | 0.79         | +                            |        |                       |        |                       |        |                                       |        |        |
| A4-1      | 186.10               | 0.80         | +                            |        |                       |        |                       |        |                                       |        |        |
| A4-2      | 186.28               | 0.84         | +                            |        |                       |        |                       |        |                                       |        |        |
| A5        | 187.84               | 0.86         | +                            |        | 3.260                 | 184.58 | 3.290                 | 184.55 | 3.200                                 | 184.64 |        |
| A6        | 187.90               | 0.81         | +                            |        | 1.850                 | 186.05 | 1.870                 | 186.03 | 1.820                                 | 186.08 |        |
| A7-1      | 188.18               | 0.95         | +                            |        |                       |        |                       |        |                                       |        |        |
| A7-2      | 187.87               | 1.20         | +                            |        |                       |        |                       |        |                                       |        |        |
| B1        | 185.38               | 0.93         | +                            |        |                       |        |                       |        |                                       |        |        |
| B2-1      | 186.30               | 0.84         | +                            |        |                       |        |                       |        |                                       |        |        |
| B2-2      | 186.45               | 0.88         | +                            |        |                       |        |                       |        |                                       |        |        |
| B2-3      | 186.23               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| B3        | 185.83               | 0.97         | +                            |        |                       |        |                       |        |                                       |        |        |
| B4-1      | 186.99               | 0.81         | +                            |        |                       |        |                       |        |                                       |        |        |
| B4-2      | 186.84               | 0.89         | +                            |        |                       |        |                       |        |                                       |        |        |
| B5        | 186.67               | 0.92         | +                            |        |                       |        |                       |        |                                       |        |        |
| C1        | 193.83               | 0.86         | +                            | 7.720  | 186.11                | 7.820  | 186.01                | 7.790  | 186.04                                | 7.790  | 186.04 |
| C2-1      | 195.41               | 0.81         | +                            | 6.130  | 189.28                | 7.052  | 188.36                | 6.825  | 188.585                               | 6.760  | 188.65 |
| C2-2      | 195.42               | 0.77         | +                            | Dry    |                       | Dry    |                       | Dry    |                                       | Dry    |        |
| C3        | 197.20               | 0.88         | +                            | 7.140  | 190.06                | 7.137  | 190.06                | 7.150  | 190.05                                | 7.100  | 190.10 |
| C4        | 189.14               | 1.00         | +                            | 4.085  | 185.06                | 4.125  | 185.02                | 4.095  | 185.045                               | 4.060  | 185.08 |
| D1-1      | 186.58               | 0.81         | +                            | 3.550  | 183.03                | 3.466  | 183.11                | 3.455  | 183.125                               | 3.450  | 183.13 |
| D1-2      | 186.69               | 0.87         | +                            | 3.670  | 183.02                | 3.657  | 183.03                | 3.625  | 183.065                               | 3.640  | 183.05 |
| D2        | 186.61               | 0.80         | +                            | 4.220  | 182.39                | 4.155  | 182.46                | 4.185  | 182.425                               | 4.130  | 182.48 |
| D3-1      | 185.82               | 0.82         | +                            | 2.620  | 183.20                | 3.530  | 182.29                | 3.150  | 182.67                                | 2.800  | 183.02 |
| D3-2      | 185.70               | 0.88         | +                            | 2.750  | 182.95                | 2.750  | 182.95                | 2.750  | 182.95                                | 2.690  | 183.01 |
| D4        | 186.33               | 1.15         | +                            | 3.260  | 183.07                | 3.345  | 182.99                | 3.335  | 182.995                               | 3.290  | 183.04 |
| D5-1      | 186.68               | 0.84         | +                            | 3.160  | 183.52                | 3.220  | 183.46                | 3.205  | 183.475                               | 3.120  | 183.56 |
| D5-2      | 186.69               | 0.91         | +                            | 3.280  | 183.41                | 3.275  | 183.42                | 3.305  | 183.385                               | 3.250  | 183.44 |
| D6        | 190.97               | 0.83         | +                            | 5.125  | 185.85                | 5.310  | 185.66                | 5.150  | 185.82                                | 5.080  | 185.89 |
| SG-1      | 183.84               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| SG-2      | 183.97               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| SG-3      | 183.93               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| SG-4      | 184.41               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| SG-5      | 193.89               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| DOMTAR    | 185.32               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 1B | 186.60               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 1A | 186.50               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 3  | 186.91               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 4A | 190.42               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 4B | 190.20               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 5  | 189.33               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 7  | 189.72               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 9A | 191.53               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 9B | 191.37               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 10 | 193.84               |              | +                            |        |                       |        |                       |        |                                       |        |        |
| GEOCON 11 | 204.82               |              | +                            |        |                       |        |                       |        |                                       |        |        |

mbtc - metres below top of casing  
masl - metres above sea level

# Appendix 5: Water Level Data

| Well ID   | Activity ---><br>Top Casing Elev. (m) | Date ---><br>Stick up (m) | + | 880829 and 30 sampling |        | 881004 water levels only |        | 881116 to 21 sampling |        | 881203 water levels only |        |
|-----------|---------------------------------------|---------------------------|---|------------------------|--------|--------------------------|--------|-----------------------|--------|--------------------------|--------|
|           |                                       |                           |   | Water Levels (mbtc)    | (masl) | Water Levels (mbtc)      | (masl) | Water Levels (mbtc)   | (masl) | Water Levels (mbtc)      | (masl) |
| A1-1      | 193.32                                | 0.94                      | + | 6.760                  | 186.56 | 6.655                    | 186.67 | 6.350                 | 186.97 | 6.375                    | 186.95 |
| A1-2      | 193.30                                | 0.90                      | + | 6.700                  | 186.60 | 6.600                    | 186.70 | 6.310                 | 186.99 | 6.330                    | 186.97 |
| A2-1      | 193.62                                | 0.92                      | + |                        |        | 5.480                    | 188.14 | 5.430                 | 188.19 | not located              |        |
| A2-2      | 193.46                                | 0.78                      | + |                        |        | 6.260                    | 187.20 | 6.270                 | 187.19 | not located              |        |
| A3        | 186.45                                | 0.79                      | + | 0.895                  | 185.56 | 0.340                    | 186.11 | 0.610                 | 185.84 | 0.670                    | 185.78 |
| A4-1      | 186.10                                | 0.80                      | + | 0.855                  | 185.25 | 0.820                    | 185.28 | 0.060                 | 186.04 | 0.755                    | 185.35 |
| A4-2      | 186.28                                | 0.84                      | + | 1.254                  | 185.03 | 1.845                    | 184.44 | 1.185                 | 185.10 | 1.205                    | 185.08 |
| A5        | 187.84                                | 0.86                      | + |                        |        | 3.130                    | 184.71 | 3.085                 | 184.76 | 3.115                    | 184.73 |
| A6        | 187.90                                | 0.81                      | + |                        |        | 1.355                    | 186.55 | 1.190                 | 186.71 | 1.330                    | 186.57 |
| A7-1      | 188.18                                | 0.95                      | + | 0.870                  | 187.31 | 0.190                    | 187.99 | 0.670                 | 187.51 | 1.285                    | 186.90 |
| A7-2      | 187.87                                | 1.20                      | + | 1.910                  | 185.96 | 1.695                    | 186.18 | 1.345                 | 186.53 | 1.300                    | 186.57 |
| B1        | 185.38                                | 0.93                      | + | 2.080                  | 183.30 | 2.090                    | 183.29 | 1.930                 | 183.45 | 1.770                    | 183.61 |
| B2-1      | 186.30                                | 0.84                      | + | 1.620                  | 184.68 | 1.620                    | 184.68 | 1.530                 | 184.77 | 1.745                    | 184.56 |
| B2-2      | 186.45                                | 0.88                      | + | 2.655                  | 183.80 | 2.650                    | 183.80 | 2.355                 | 184.10 | 2.405                    | 184.05 |
| B2-3      | 186.23                                |                           | + |                        |        |                          |        | 2.070                 |        | 1.675                    |        |
| B3        | 185.83                                | 0.97                      | + | 2.660                  | 183.17 | 2.625                    | 183.21 | 2.480                 | 183.35 | 2.305                    | 183.53 |
| B4-1      | 186.99                                | 0.81                      | + | 3.070                  | 183.92 | 3.105                    | 183.89 | 3.040                 | 183.95 | 2.970                    | 184.02 |
| B4-2      | 186.84                                | 0.89                      | + | 3.600                  | 183.24 | 3.675                    | 183.17 | 3.540                 | 183.30 | 3.455                    | 183.39 |
| B5        | 186.67                                | 0.92                      | + | 3.430                  | 183.24 | 3.505                    | 183.17 | 3.385                 | 183.29 | 3.295                    | 183.38 |
| C1        | 193.83                                | 0.86                      | + |                        |        | 7.750                    | 186.08 | 7.740                 | 186.09 | 7.730                    | 186.10 |
| C2-1      | 195.41                                | 0.81                      | + |                        |        | 6.735                    | 188.68 | 6.730                 | 188.68 | 6.700                    | 188.71 |
| C2-2      | 195.42                                | 0.77                      | + |                        |        | Dry                      |        | Dry                   |        | Dry                      |        |
| C3        | 197.20                                | 0.88                      | + |                        |        | 7.030                    | 190.17 | 7.005                 | 190.20 | 7.010                    | 190.19 |
| C4        | 189.14                                | 1.00                      | + |                        |        | 3.830                    | 185.31 | 6.200* suspect        |        | 2.610                    | 186.53 |
| D1-1      | 186.58                                | 0.81                      | + |                        |        | 3.310                    | 183.27 | 2.985                 | 183.60 | 3.125                    | 183.46 |
| D1-2      | 186.69                                | 0.87                      | + |                        |        | 3.505                    | 183.19 | 3.180                 | 183.51 | 3.235                    | 183.46 |
| D2        | 186.61                                | 0.80                      | + |                        |        | 3.405                    | 183.21 | 3.430                 | 183.18 | 3.240                    | 183.37 |
| D3-1      | 185.82                                | 0.82                      | + |                        |        | 2.410                    | 183.41 | 2.455                 | 183.37 | 2.460                    | 183.36 |
| D3-2      | 185.70                                | 0.88                      | + |                        |        | 2.565                    | 183.14 | 2.280                 | 183.42 | 2.385                    | 183.32 |
| D4        | 186.33                                | 1.15                      | + |                        |        | 3.150                    | 183.18 | 3.180                 | 183.15 | 2.950                    | 183.38 |
| D5-1      | 186.68                                | 0.84                      | + |                        |        | 3.030                    | 183.65 | 2.880                 | 183.80 | 2.930                    | 183.75 |
| D5-2      | 186.69                                | 0.91                      | + |                        |        | 3.160                    | 183.53 | 3.145                 | 183.55 | 3.055                    | 183.64 |
| D6        | 190.97                                | 0.83                      | + |                        |        | 4.350                    | 186.62 | 4.055                 | 186.92 | 4.630                    | 186.34 |
| SG-1      | 183.84                                |                           | + |                        |        | 0.274                    | 183.57 | 0.250                 | 183.59 | not located              |        |
| SG-2      | 183.97                                |                           | + |                        |        | 0.306                    | 183.66 | 0.452                 | 183.52 | 0.310                    | 183.66 |
| SG-3      | 183.93                                |                           | + |                        |        | 0.225                    | 183.71 | 0.475                 | 183.46 | 0.390                    | 183.54 |
| SG-4      | 184.41                                |                           | + |                        |        | 0.190                    | 184.22 | 0.288                 | 184.12 | 0.400                    | 184.01 |
| SG-5      | 193.89                                |                           | + |                        |        | 0.206                    | 193.68 | 0.403                 | 193.49 | 0.170                    | 193.72 |
| DOMTAR    | 185.32                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 1B | 186.60                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 1A | 186.50                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 3  | 186.91                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 4A | 190.42                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 4B | 190.20                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 5  | 189.33                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 7  | 189.72                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 9A | 191.53                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 9B | 191.37                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 10 | 193.84                                |                           | + |                        |        |                          |        |                       |        |                          |        |
| GEOCON 11 | 204.82                                |                           | + |                        |        |                          |        |                       |        |                          |        |

mbtc - metres below top of casing

masl - metres above sea level

## Appendix 5: Water Level Data

|           | Activity --->        | Date --->    | + 890211<br>+ water levels<br>only |         | 890306/10<br>sampling  |        | 890529/31<br>sampling  |        | 890601<br>water levels<br>only |            |
|-----------|----------------------|--------------|------------------------------------|---------|------------------------|--------|------------------------|--------|--------------------------------|------------|
| Well ID   | Top Casing Elev. (m) | Stick up (m) | + Water Levels<br>+ (mbtc)         | (masl)  | Water Levels<br>(mbtc) | (masl) | Water Levels<br>(mbtc) | (masl) | Water Levels<br>(mbtc)         | (masl)     |
| A1-1      | 193.32               | 0.94         | + 6.745                            | 186.575 | 6.820                  | 186.50 | 6.690                  | 186.63 | 6.690                          | 186.63     |
| A1-2      | 193.30               | 0.90         | + 6.615                            | 186.685 | 6.690                  | 186.61 | 6.520                  | 186.78 | 6.500                          | 186.80     |
| A2-1      | 193.62               | 0.92         | + not accessible                   |         | 5.900                  | 187.72 | 5.665                  | 187.96 | 9.603                          | not static |
| A2-2      | 193.46               | 0.78         | + not accessible                   |         | 6.430                  | 187.03 | 6.385                  | 187.08 | 6.310                          | 187.15     |
| A3        | 186.45               | 0.79         | + not accessible                   |         | Buried                 |        | Buried                 |        | not recorded                   |            |
| A4-1      | 186.10               | 0.80         | + not accessible                   |         | 1.410                  | 184.69 | 1.150                  | 184.95 | 1.190                          | 184.91     |
| A4-2      | 186.28               | 0.84         | + not accessible                   |         | Frozen                 |        | 1.260                  | 185.02 | 1.275                          | 185.01     |
| A5        | 187.84               | 0.86         | + not accessible                   |         | 3.110                  | 184.73 | 3.120                  | 184.72 | 3.124                          | 184.72     |
| A6        | 187.90               | 0.81         | + not accessible                   |         | 1.710                  | 186.19 | 1.640                  | 186.26 | 1.664                          | 186.24     |
| A7-1      | 188.18               | 0.95         | + not accessible                   |         | Frozen                 |        | 2.020                  | 186.16 | 1.780                          | 186.40     |
| A7-2      | 187.87               | 1.20         | + not accessible                   |         | 1.260                  | 186.61 | 1.500                  | 186.37 | 1.600                          | 186.27     |
| B1        | 185.38               | 0.93         | + 2.180                            | 183.200 | 2.310                  | 183.07 | not recorded           |        | 2.047                          | 183.33     |
| B2-1      | 186.30               | 0.84         | + 1.955                            | 184.345 | 2.160                  | 184.14 | 2.130                  | 184.17 | 2.135                          | 184.17     |
| B2-2      | 186.45               | 0.88         | + 2.820                            | 183.630 | 3.060                  | 183.39 | 2.730                  | 183.72 | 2.700                          | 183.75     |
| B2-3      | 186.23               |              | + 1.865                            |         | 2.255                  | 183.98 | 2.035                  | 184.20 | 2.055                          | 184.18     |
| B3        | 185.83               | 0.97         | + 2.805                            | 183.025 | 2.945                  | 182.89 | not recorded           |        | 2.695                          | 183.14     |
| B4-1      | 186.99               | 0.81         | + not accessible                   |         | 3.420                  | 183.57 | 3.280                  | 183.71 | 3.505                          | 183.49     |
| B4-2      | 186.84               | 0.89         | + not accessible                   |         | 3.930                  | 182.91 | 3.690                  | 183.15 | 3.743                          | 183.10     |
| B5        | 186.67               | 0.92         | + not accessible                   |         | 3.840                  | 182.83 | 3.510                  | 183.16 | 3.572                          | 183.10     |
| C1        | 193.83               | 0.86         | + not accessible                   |         | 7.775                  | 186.06 | 7.770                  | 186.06 | 7.775                          | 186.06     |
| C2-1      | 195.41               | 0.81         | + 6.795                            | 188.615 | 6.760                  | 188.65 | 6.740                  | 188.67 | 6.795                          | 188.62     |
| C2-2      | 195.42               | 0.77         | + Dry                              |         | Dry                    |        | Dry                    |        | Dry                            |            |
| C3        | 197.20               | 0.88         | + 7.050                            | 190.150 | 7.065                  | 190.14 | 7.035                  | 190.17 | 7.030                          | 190.17     |
| C4        | 189.14               | 1.00         | + 3.900                            | 185.240 | not recorded           |        | 3.850                  | 185.29 | 3.850                          | 185.29     |
| D1-1      | 186.58               | 0.81         | + 3.390                            | 183.190 | 3.590                  | 182.99 | 3.330                  | 183.25 | 3.285                          | 183.30     |
| D1-2      | 186.69               | 0.87         | + 3.640                            | 183.050 | 3.760                  | 182.93 | 3.590                  | 183.10 | 3.490                          | 183.20     |
| D2        | 186.61               | 0.80         | + 3.570                            | 183.040 | 3.700                  | 182.91 | 3.505                  | 183.11 | 3.495                          | 183.12     |
| D3-1      | 185.82               | 0.82         | + not accessible                   |         | 2.765                  | 183.06 | 2.635                  | 183.19 | 2.910                          | static?    |
| D3-2      | 185.70               | 0.88         | + not accessible                   |         | 2.830                  | 182.87 | 2.560                  | 183.14 | 2.555                          | 183.15     |
| D4        | 186.33               | 1.15         | + 3.295                            | 183.035 | 3.455                  | 182.88 | 3.250                  | 183.08 | 3.225                          | 183.11     |
| D5-1      | 186.68               | 0.84         | + 3.095                            | 183.585 | 3.195                  | 183.49 | 3.030                  | 183.65 | 3.115                          | 183.57     |
| D5-2      | 186.69               | 0.91         | + 3.205                            | 183.485 | 3.230                  | 183.46 | 3.150                  | 183.54 | 3.179                          | 183.51     |
| D6        | 190.97               | 0.83         | + 5.200                            | 185.770 | 5.410                  | 185.56 | 5.200                  | 185.77 | 5.600                          | 185.37     |
| SG-1      | 183.84               |              | + water frozen                     |         | water frozen           |        | 0.06                   | 183.78 | 0.060                          | 183.78     |
| SG-2      | 183.97               |              | + water frozen                     |         | water frozen           |        | not recorded           |        |                                |            |
| SG-3      | 183.93               |              | + water frozen                     |         | water frozen           |        | 0.25                   | 183.68 | 0.136                          | 183.79     |
| SG-4      | 184.41               |              | + water frozen                     |         | water frozen           |        | 0.210                  | 184.20 | 0.210                          | 184.20     |
| SG-5      | 193.89               |              | + water frozen                     |         | water frozen           |        | not recorded           |        |                                |            |
| DOMTAR    | 185.32               |              | +                                  |         |                        |        |                        |        | 0.600                          | 184.72     |
| GEOCON 1B | 186.60               |              | +                                  |         |                        |        |                        |        | 1.425                          | 185.18     |
| GEOCON 1A | 186.50               |              | +                                  |         |                        |        |                        |        | 1.705                          | 184.80     |
| GEOCON 3  | 186.91               |              | +                                  |         |                        |        |                        |        | 3.050                          | 183.86     |
| GEOCON 4A | 190.42               |              | +                                  |         |                        |        |                        |        | 5.255                          | 185.17     |
| GEOCON 4B | 190.20               |              | +                                  |         |                        |        |                        |        | 5.355                          | 184.85     |
| GEOCON 5  | 189.33               |              | +                                  |         |                        |        |                        |        | 5.415                          | 183.92     |
| GEOCON 7  | 189.72               |              | +                                  |         |                        |        |                        |        | 4.760                          | 184.96     |
| GEOCON 9A | 191.53               |              | +                                  |         |                        |        |                        |        | 2.300                          | 189.23     |
| GEOCON 9B | 191.37               |              | +                                  |         |                        |        |                        |        | 2.065                          | 189.31     |
| GEOCON 10 | 193.84               |              | +                                  |         |                        |        |                        |        | 6.415                          | 187.43     |
| GEOCON 11 | 204.82               |              | +                                  |         |                        |        |                        |        | 14.865                         | 189.96     |

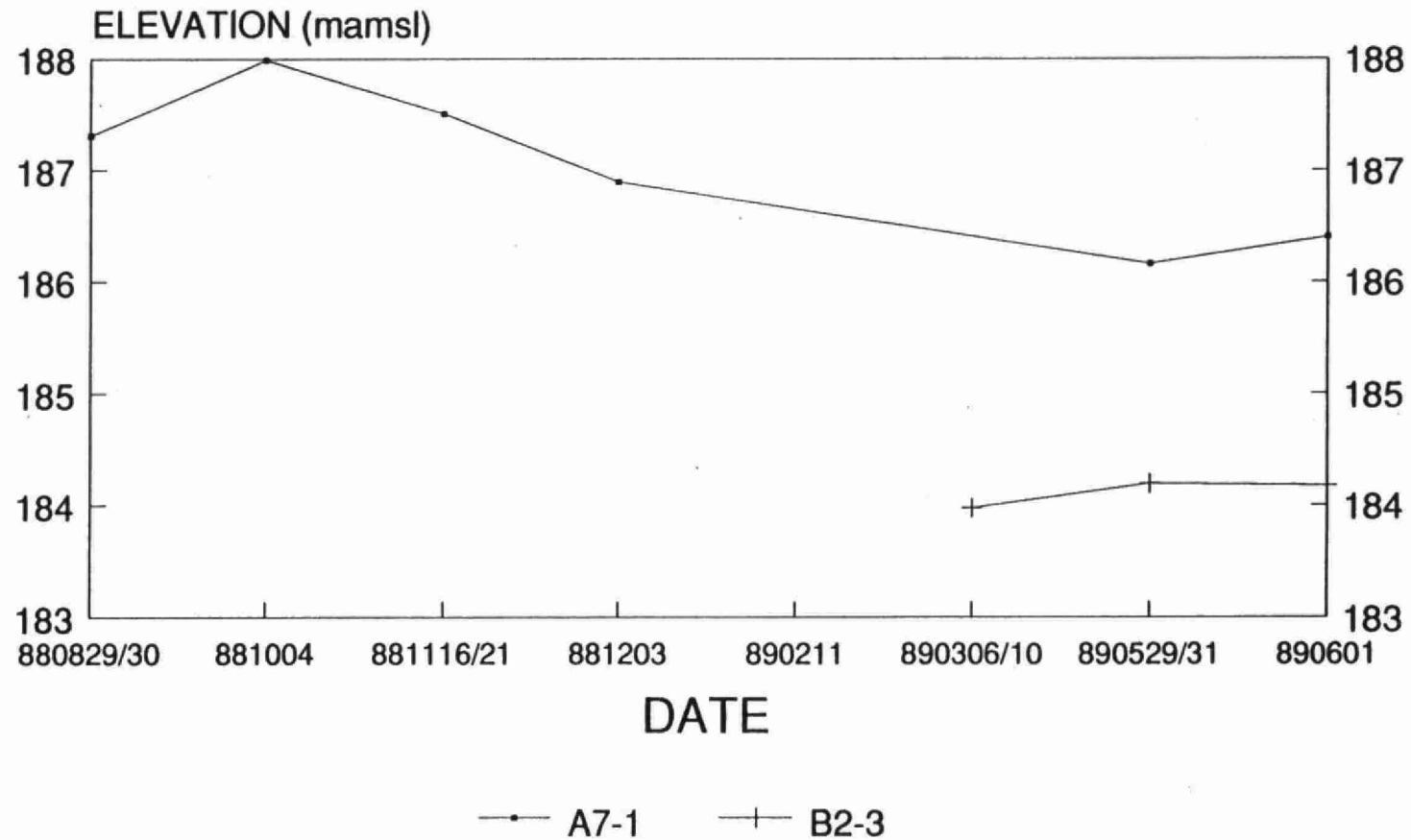
mbtc - metres below top of casing

masl - metres above sea level

**HYDROGRAPHS**

# ALGOMA WATER ELEVATIONS

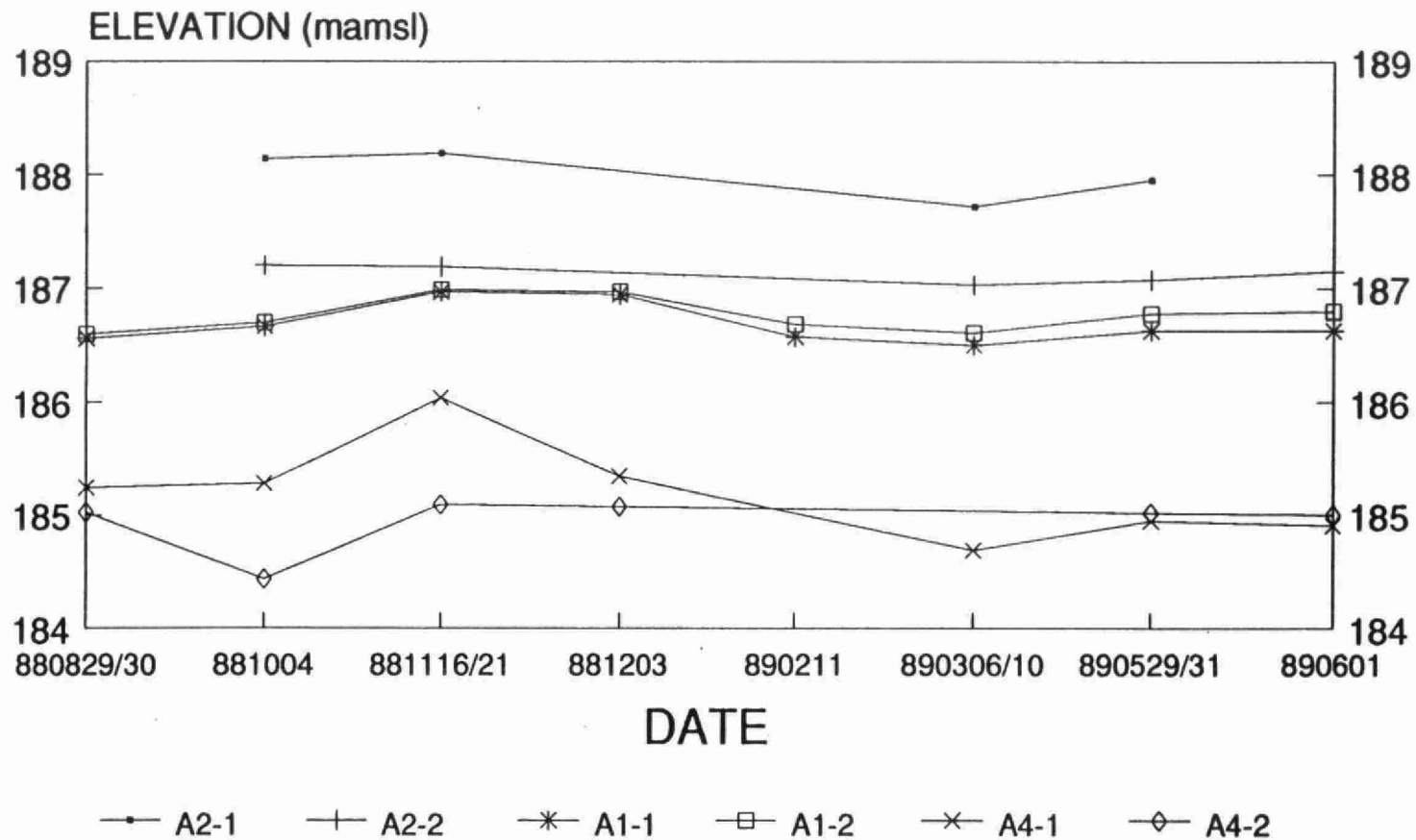
## Bedrock Wells





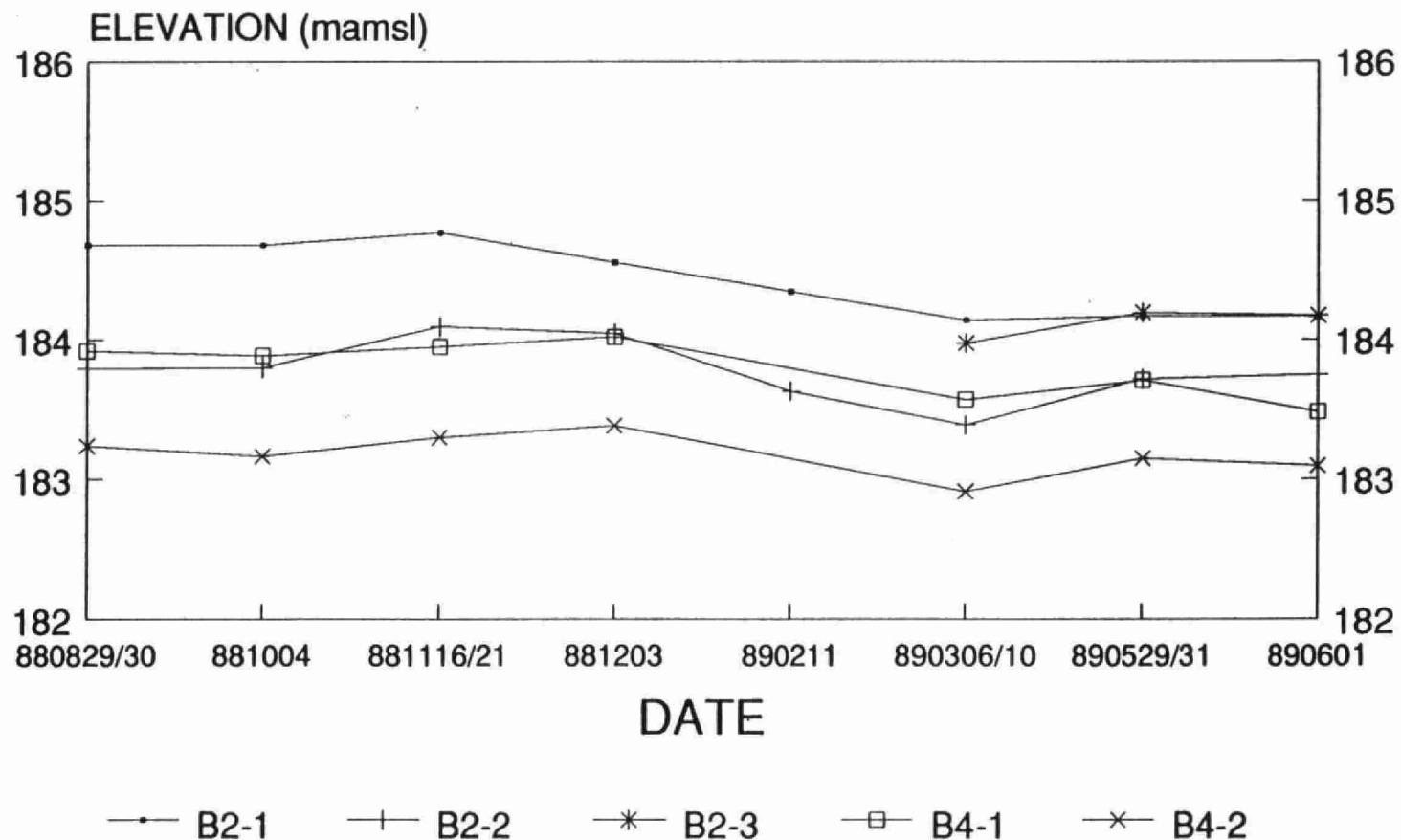
# ALGOMA WATER ELEVATIONS

## Site Interior Nests



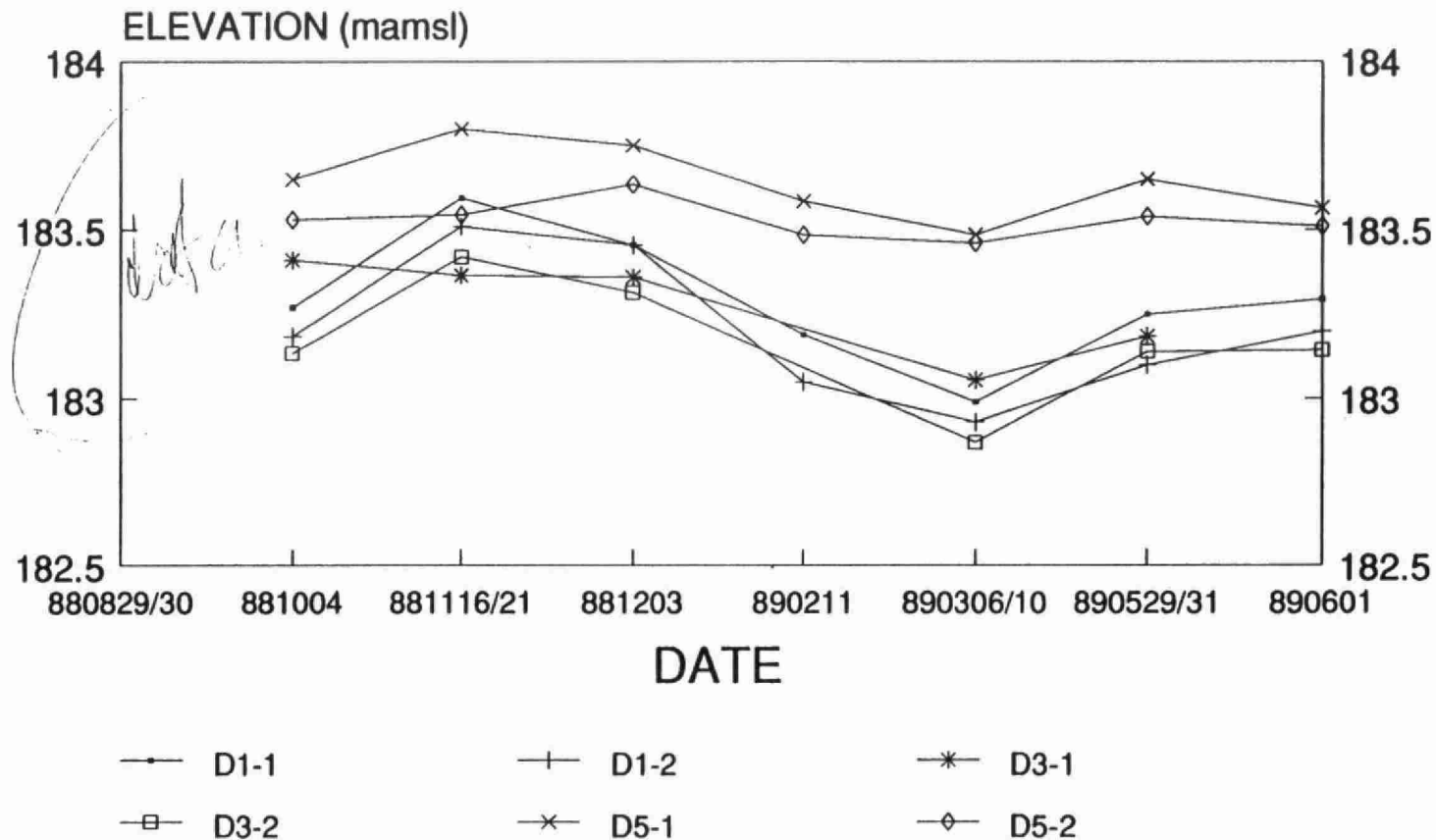
# ALGOMA WATER ELEVATIONS

## Shoreline Nests 1



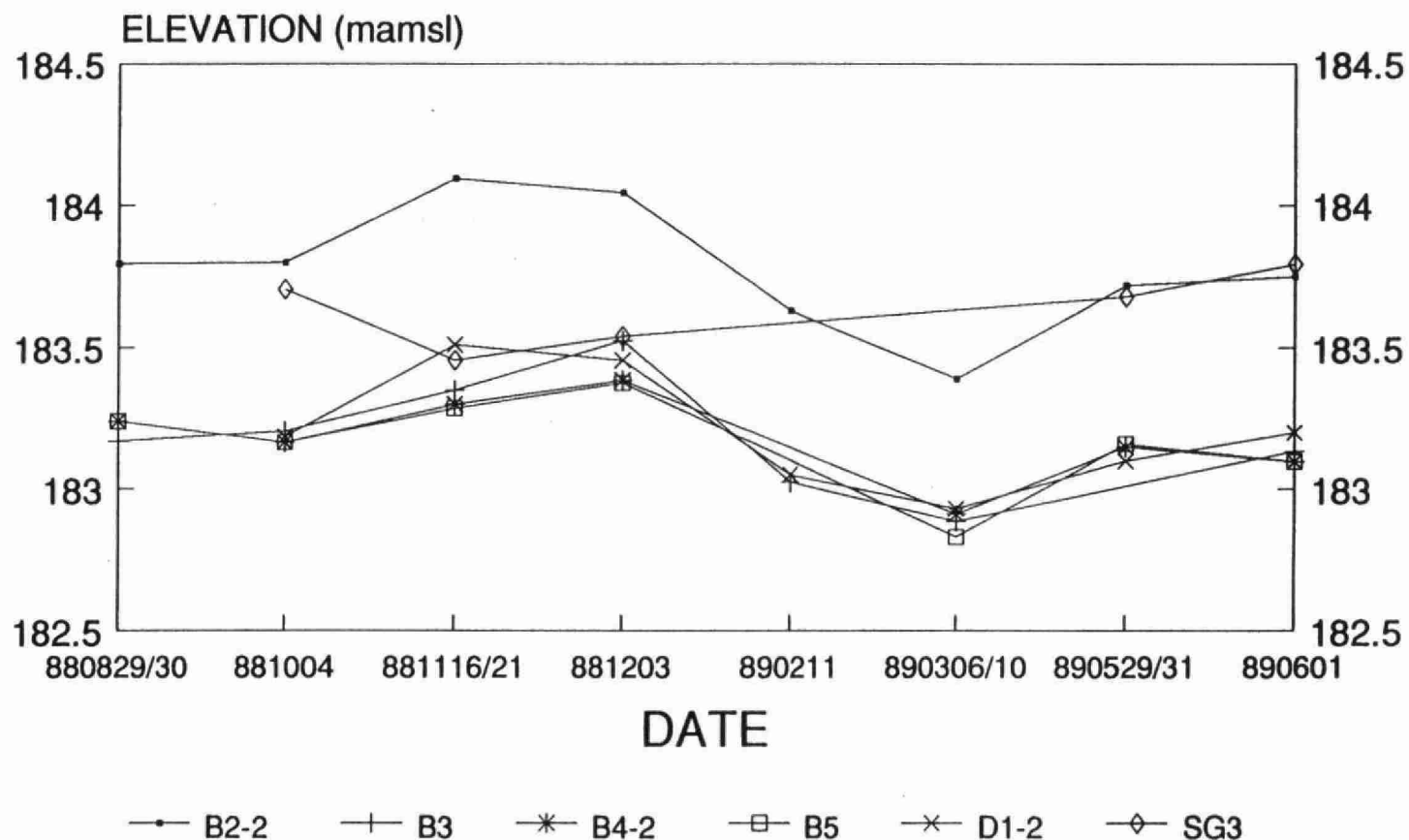
# ALGOMA WATER ELEVATIONS

## Shoreline Nests 2



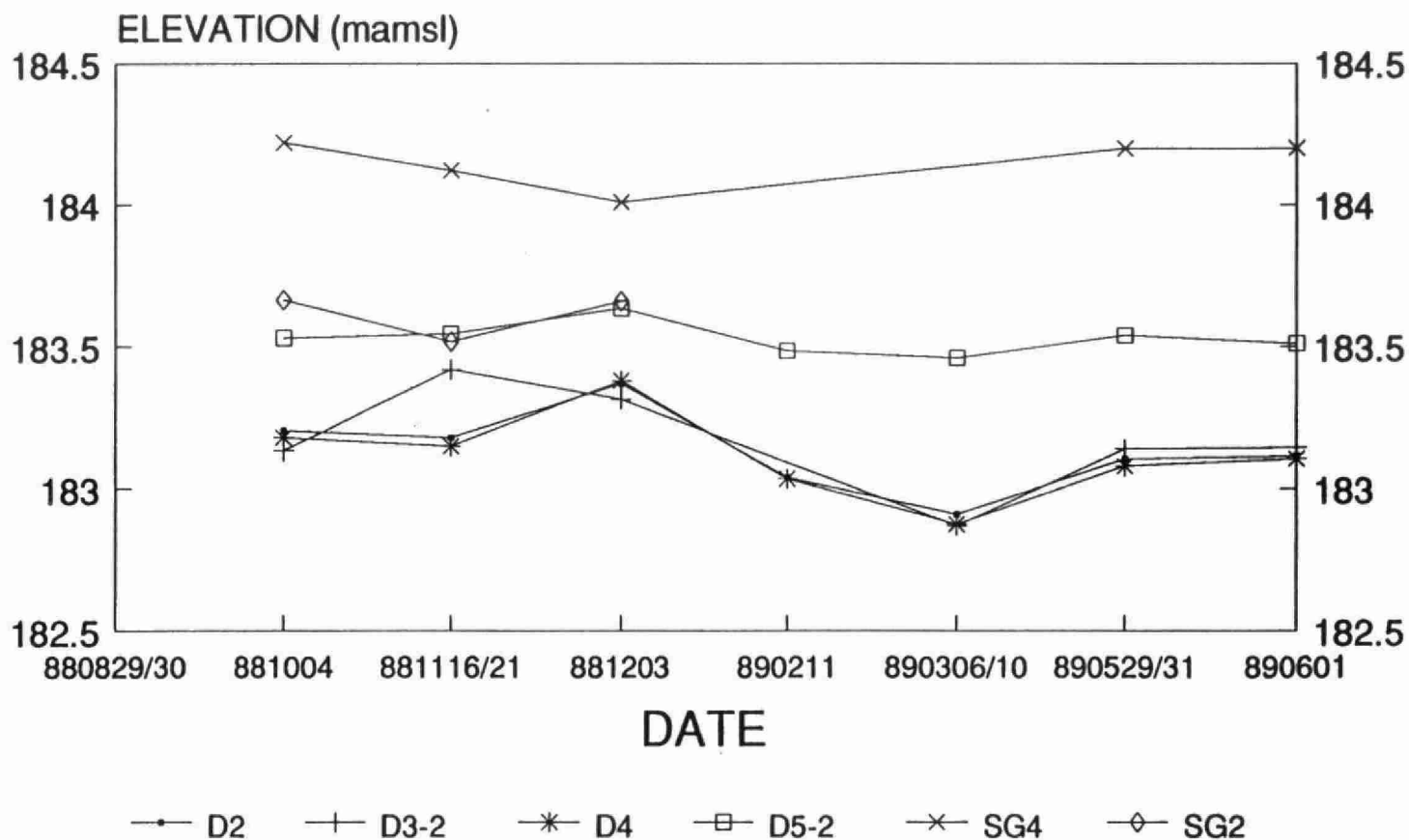
# ALGOMA WATER ELEVATIONS

## Shoreline Watertable Wells 1



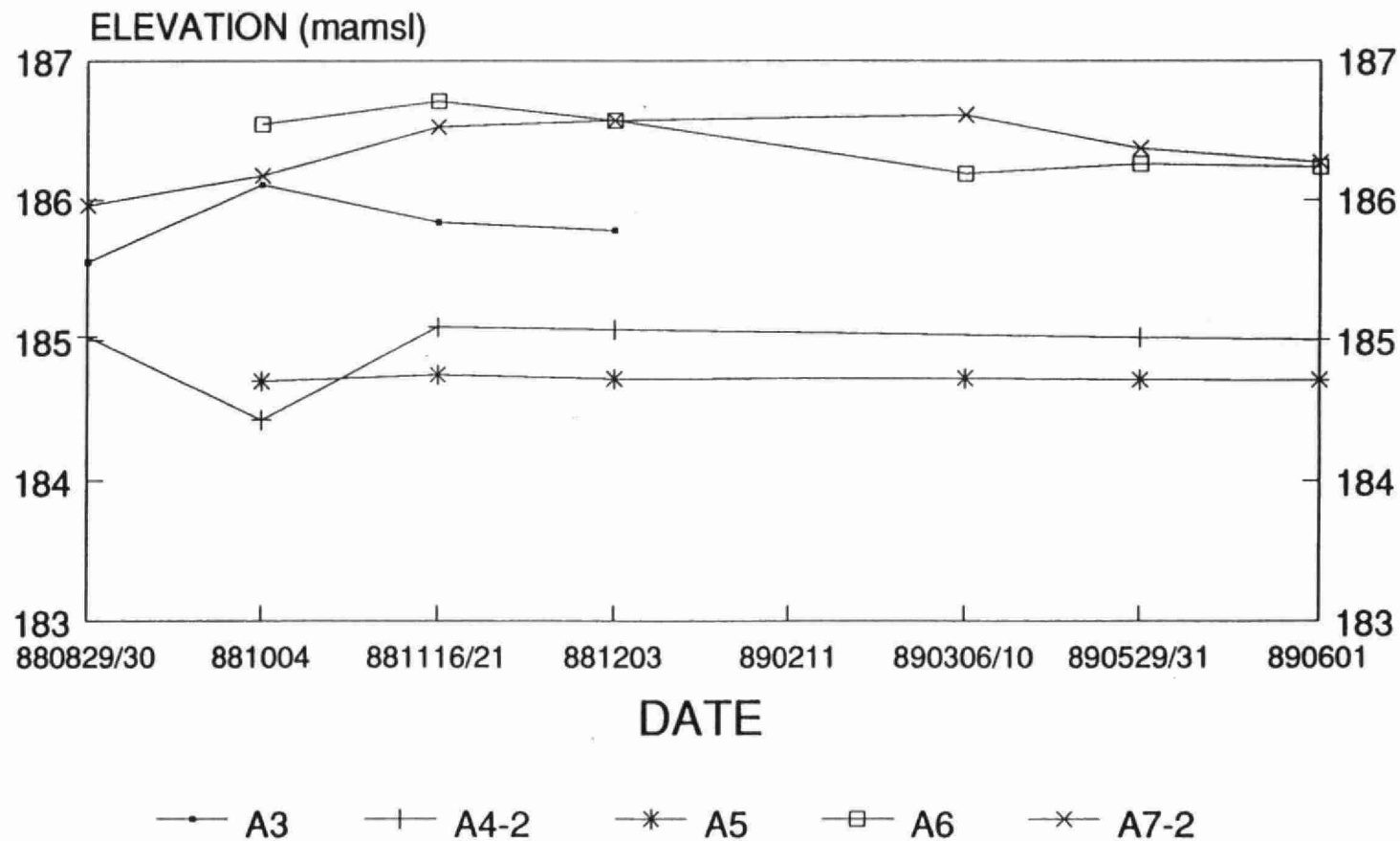
# ALGOMA WATER ELEVATIONS

## Shoreline Watertable Wells 2



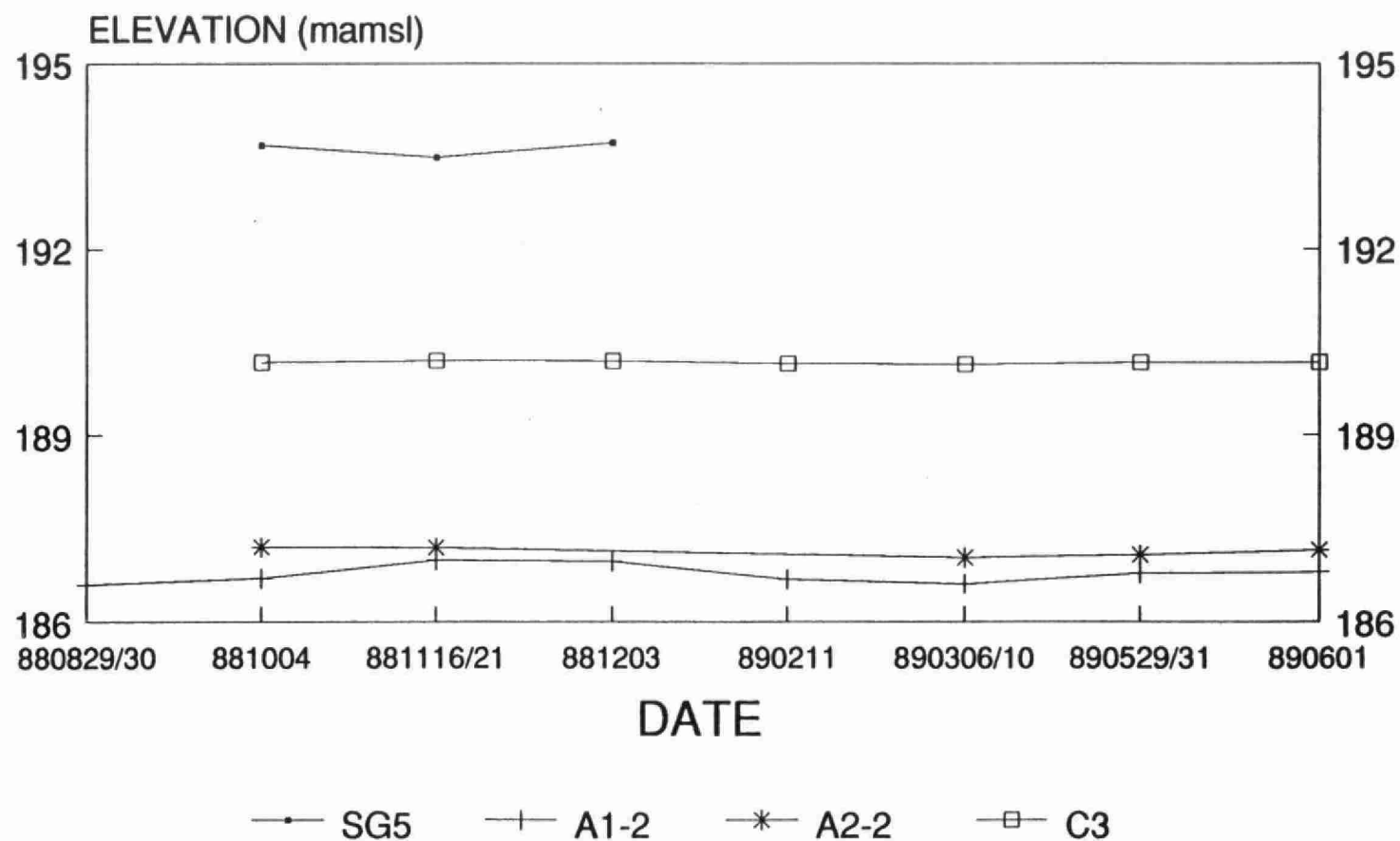
# ALGOMA WATER ELEVATIONS

## Interior Watertable Wells 1



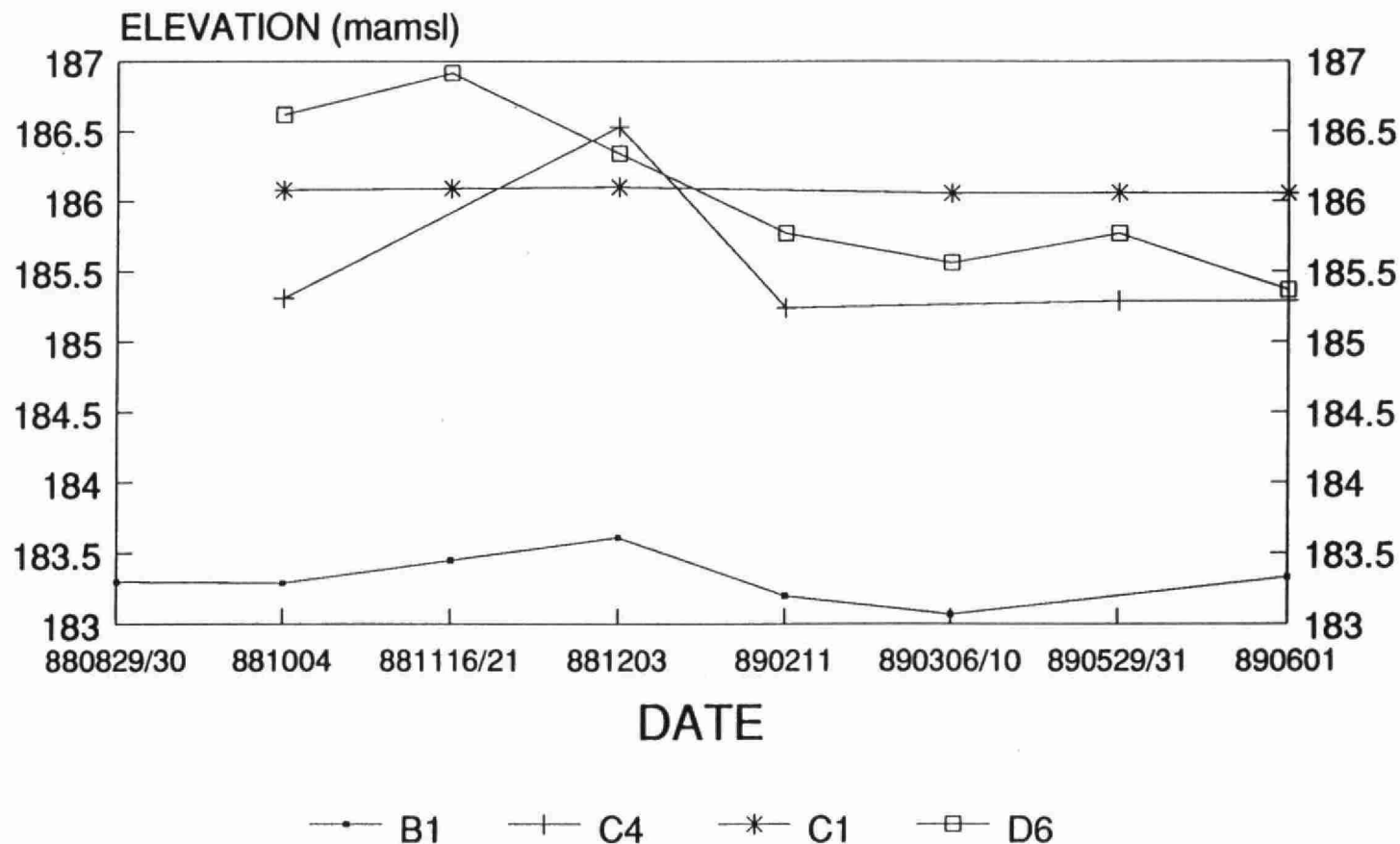
# ALGOMA WATER ELEVATIONS

## Interior Watertable Wells 2



# ALGOMA WATER ELEVATIONS

## Interior Watertable Wells 3





## **APPENDIX 6**

### **Groundwater Chemical Quality Data and QA/QC Results**

**GROUNDWATER**

## Appendix 6: Groundwater

| PIEZOMETER                                       | A1-1      | A1-1      | A1-1     | A1-1      | Average    | Standard Deviation |
|--------------------------------------------------|-----------|-----------|----------|-----------|------------|--------------------|
| SAMPLE DATE                                      | 88/08/30  | 88/11/16  | 89/03/10 | 89/05/30  |            |                    |
| BAS REF NO.                                      | 8809032-1 | 8811092-5 | 890377-1 | 8906008-1 |            |                    |
| SAMPLING LEVEL                                   | 1         | 2         | 1        | 1         |            |                    |
| pH                                               | 6.56      | 6.4       | 6.01     | 6.51      | 6.3700     | 0.2158             |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 4440      | 7250      | 9590     | 5580      | 6715.0000  | 1937.5048          |
| TEMPERATURE (C)                                  | 11.5      | 11        | 9        | 12        | 10.8750    | 1.1388             |
| DISSOLVED OXYGEN                                 | 4.2       | NA        | 0        | 0         | 1.4000     | 1.9799             |
| DIC                                              | NA        | NA        | NA       | NA        | -          | -                  |
| ALKALINITY                                       | NA        | 57/57     | 44       | 37        | 46.0000    | 8.2865             |
| SULPHIDE                                         | NA        | NA        | NA       | NA        | -          | -                  |
| TOTAL CYANIDE                                    | NA        | 0.012     | NA       | NA        | 0.0120     | 0.0000             |
| BROMIDE                                          | <10       | <2        | 6        | <1        | 1.5000     | 2.5981             |
| CHLORIDE                                         | 1150      | 1400      | 1660     | 1870      | 1520.0000  | 270.8321           |
| FLUORIDE                                         | <1        | 3.5       | <1       | 2.3       | 1.4500     | 1.5108             |
| SULPHATE                                         | 1600      | 1580      | 1400     | 1590      | 1542.5000  | 82.5757            |
| NITRATE-N                                        | 2         | 0.5       | 1        | 0.75      | 1.0625     | 0.5694             |
| AMMONIA-N                                        | NA        | NA        | NA       | NA        | -          | -                  |
| TOTAL KJELDAHL NITROGEN                          | NA        | NA        | NA       | NA        | -          | -                  |
| TOTAL PHOSPHOROUS                                | NA        | NA        | NA       | NA        | -          | -                  |
| DOC                                              | 178       | NA        | 200      | 165       | 181.0000   | 14.4453            |
| PHENOLS                                          | 0.88      | 4.8       | 2.9      | 1.05      | 2.4075     | 1.5924             |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA        | NA        | NA       | NA        | -          | -                  |
| OIL AND GREASE                                   | 23        | NA        | NA       | NA        | 23.0000    | 0.0000             |
| ZINC                                             | 0.05      | NA        | NA       | NA        | 0.0500     | 0.0000             |
| CADMIUM                                          | 0.007     | NA        | NA       | NA        | 0.0070     | 0.0000             |
| MANGANESE                                        | 85/86     | NA        | NA       | NA        | 85.5000    | 0.0000             |
| COBALT                                           | 0.06      | NA        | NA       | NA        | 0.0600     | 0.0000             |
| COPPER                                           | 0.01      | NA        | NA       | NA        | 0.0100     | 0.0000             |
| IRON                                             | 330       | NA        | NA       | NA        | 330.0000   | 0.0000             |
| LEAD                                             | 0.1/0.1   | NA        | NA       | NA        | 0.1000     | 0.0000             |
| CHROMIUM                                         | 0.05      | NA        | NA       | NA        | 0.0500     | 0.0000             |
| NICKEL                                           | 0.03      | NA        | NA       | NA        | 0.0300     | 0.0000             |
| BERYLLIUM                                        | NA        | NA        | NA       | NA        | -          | -                  |
| MOLYBDENUM                                       | NA        | NA        | NA       | NA        | -          | -                  |
| CALCIUM                                          | NA        | 670/680   | 730      | 730       | 711.6667   | 25.9272            |
| VANADIUM                                         | NA        | NA        | NA       | NA        | -          | -                  |
| ALUMINUM                                         | NA        | NA        | NA       | NA        | -          | -                  |
| MAGNESIUM                                        | NA        | 210/210   | 250      | 270       | 243.3333   | 24.9444            |
| BARIUM                                           | NA        | NA        | NA       | NA        | -          | -                  |
| POTASSIUM                                        | NA        | 131       | 147      | 147       | 141.6667   | 7.5425             |
| STRONTIUM                                        | NA        | NA        | NA       | NA        | -          | -                  |
| SODIUM                                           | NA        | 135       | 164      | 165       | 154.6667   | 13.9124            |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA        | NA        | NA       | NA        | -          | -                  |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA        | NA        | NA       | NA        | -          | -                  |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA        | NA        | NA       | NA        | -          | -                  |
| CATION EQUIVALENCE                               | 11.82     | 60.18     | 67.89    | 69.58     |            |                    |
| ANION EQUIVALENCE                                | 65.78     | 72.97     | 76.43    | 86.24     |            |                    |
| CHARGE BALANCE ERROR                             | -69.54    | -9.60     | -5.92    | -10.69    |            |                    |
| BTX ( $\mu\text{g}/\text{L}$ )                   |           |           |          |           |            |                    |
| BENZENE                                          | NA        | 67000     | NA       | NA        | 67000.0000 | 0.0000             |
| TOLUENE                                          | NA        | 2580      | NA       | NA        | 2580.0000  | 0.0000             |
| XYLENE                                           | NA        | 733       | NA       | NA        | 733.0000   | 0.0000             |
| TOTAL BTX                                        | -         | 70313     | -        | -         | 70313.0000 | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A1-1 | A1-1 | A1-1 | A1-1 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | 2.3  | NA   | NA   | 2.3000  | 0.0000                |
| ACENAPHTHENE            | NA   | 1    | NA   | NA   | 1.0000  | 0.0000                |
| FLUORENE                | NA   | 0.4  | NA   | NA   | 0.4000  | 0.0000                |
| PHENANTHRENE            | NA   | 0.8  | NA   | NA   | 0.8000  | 0.0000                |
| ANTHRACENE              | NA   | 0.4  | NA   | NA   | 0.4000  | 0.0000                |
| FLUORANTHENE            | NA   | 0.1  | NA   | NA   | 0.1000  | 0.0000                |
| PYRENE                  | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| PERYLENE                | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 | NA   | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | 5    | -    | -    | 5.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A1-2      | A1-2      | A1-2     | A1-2      | Average    | Standard Deviation |
|------------------------------|-----------|-----------|----------|-----------|------------|--------------------|
| SAMPLE DATE                  | 88/08/30  | 88/11/16  | 89/03/10 | 89/05/30  |            |                    |
| BAS REF NO.                  | 8809032-9 | 8811092-6 | 890377-2 | 8906008-2 |            |                    |
| SAMPLING LEVEL               | 3         | 2         | 1        | 1         |            |                    |
| pH                           | 6.88      | 6.87      | 6.66     | 6.95      | 6.8400     | 0.1084             |
| SPECIFIC CONDUCTANCE (µS/cm) | 7020      | 3450      | 5760     | 3340      | 4892.5000  | 1562.8400          |
| TEMPERATURE (C)              | 11        | 8         | 9        | 11        | 9.7500     | 1.2990             |
| DISSOLVED OXYGEN             | 2.5       | NA        | 0        | 0         | 0.8333     | 1.1785             |
| DIC                          | 56        | NA        | NA       | NA        | 56.0000    | 0.0000             |
| ALKALINITY                   | 79        | 161       | 260      | 310       | 202.5000   | 89.2146            |
| SULPHIDE                     | <0.05     | NA        | NA       | NA        | 0.0000     | 0.0000             |
| TOTAL CYANIDE                | 0.022     | 0.014     | NA       | NA        | 0.0180     | 0.0040             |
| BROMIDE                      | <10       | <2        | <5       | <2        | 0.0000     | 0.0000             |
| CHLORIDE                     | 440       | 280       | 270      | 240       | 307.5000   | 77.9022            |
| FLUORIDE                     | 11        | 11        | 10       | 9.2       | 10.3000    | 0.7550             |
| SULPHATE                     | 4700      | 2900      | 2100     | 1900      | 2900.0000  | 1104.5361          |
| NITRATE-N                    | 2         | 0.5       | 0.5      | 1.5       | 1.1250     | 0.6495             |
| AMMONIA-N                    | 12.4      | NA        | NA       | NA        | 12.4000    | 0.0000             |
| TOTAL KJELDAHL NITROGEN      | 17.7      | NA        | NA       | NA        | 17.7000    | 0.0000             |
| TOTAL PHOSPHOROUS            | 0.17      | NA        | NA       | NA        | 0.1700     | 0.0000             |
| DOC                          | 670       | NA        | 400      | 330       | 466.6667   | 146.5909           |
| PHENOLS                      | 1.4       | 2.4       | 2.5/2.2  | 3.8       | 2.4875     | 0.8561             |
| PCB (µg/L)                   | <0.1      | NA        | NA       | NA        | 0.0000     | 0.0000             |
| OIL AND GREASE               | NA        | NA        | NA       | NA        | -          | -                  |
| ZINC                         | 0.1       | NA        | NA       | NA        | 0.1000     | 0.0000             |
| CADMIUM                      | 0.0002    | NA        | NA       | NA        | 0.0002     | 0.0000             |
| MANGANESE                    | 320       | NA        | NA       | NA        | 320.0000   | 0.0000             |
| COBALT                       | 0.08      | NA        | NA       | NA        | 0.0800     | 0.0000             |
| COPPER                       | 0.015     | NA        | NA       | NA        | 0.0150     | 0.0000             |
| IRON                         | 620       | NA        | NA       | NA        | 620.0000   | 0.0000             |
| LEAD                         | 0.4       | NA        | NA       | NA        | 0.4000     | 0.0000             |
| CHROMIUM                     | 0.06      | NA        | NA       | NA        | 0.0600     | 0.0000             |
| NICKEL                       | 0.04      | NA        | NA       | NA        | 0.0400     | 0.0000             |
| BERYLLIUM                    | <0.01     | NA        | NA       | NA        | 0.0000     | 0.0000             |
| MOLYBDENUM                   | 0.06      | NA        | NA       | NA        | 0.0600     | 0.0000             |
| CALCIUM                      | 410       | 340       | 330      | 280       | 340.0000   | 46.3681            |
| VANADIUM                     | 0.07      | NA        | NA       | NA        | 0.0700     | 0.0000             |
| ALUMINUM                     | 1.16      | NA        | NA       | NA        | 1.1600     | 0.0000             |
| MAGNESIUM                    | 620       | 260       | 300      | 230       | 352.5000   | 156.4249           |
| BARIUM                       | 0.14      | NA        | NA       | NA        | 0.1400     | 0.0000             |
| POTASSIUM                    | 134       | 124       | 144      | 133       | 133.7500   | 7.0843             |
| STRONTIUM                    | 2.1       | NA        | NA       | NA        | 2.1000     | 0.0000             |
| SODIUM                       | 310       | 230       | 250      | 220       | 252.5000   | 34.9106            |
| ARSENIC (µg/L)               | 8         | NA        | NA       | NA        | 8.0000     | 0.0000             |
| SELENIUM (µg/L)              | <1.0      | NA        | NA       | NA        | 0.0000     | 0.0000             |
| MERCURY (µg/L)               | <0.05     | NA        | NA       | NA        | 0.0000     | 0.0000             |
| CATION EQUIVALENCE           | 110.71    | 51.53     | 55.71    | 45.87     |            |                    |
| ANION EQUIVALENCE            | 111.09    | 69.89     | 53.94    | 49.45     |            |                    |
| CHARGE BALANCE ERROR         | -0.17     | -15.12    | 1.61     | -3.76     |            |                    |
| BTX (µg/L)                   |           |           |          |           |            |                    |
| BENZENE                      | NA        | 42000     | NA       | NA        | 42000.0000 | 0.0000             |
| TOLUENE                      | NA        | 870       | NA       | NA        | 870.0000   | 0.0000             |
| XYLENE                       | NA        | 1500      | NA       | NA        | 1500.0000  | 0.0000             |
| TOTAL BTX                    | -         | 44370     | -        | -         | 44370.0000 | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A1-2  | A1-2 | A1-2 | A1-2 | Average | Standard<br>Deviation |
|-------------------------|-------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |       |      |      |      |         |                       |
| NAPHTHALENE             | 23    | 12.5 | NA   | NA   | 17.7500 | 5.2500                |
| ACENAPHTHYLENE          | 7     | 10.4 | NA   | NA   | 8.7000  | 1.7000                |
| ACENAPHTHENE            | 0.92  | 1.7  | NA   | NA   | 1.3100  | 0.3900                |
| FLUORENE                | 10.5  | 3.6  | NA   | NA   | 7.0500  | 3.4500                |
| PHENANTHRENE            | 2     | 1.4  | NA   | NA   | 1.7000  | 0.3000                |
| ANTHRACENE              | 0.39  | 0.9  | NA   | NA   | 0.6450  | 0.2550                |
| FLUORANTHENE            | 0.9   | 0.1  | NA   | NA   | 0.5000  | 0.4000                |
| PYRENE                  | 0.18  | <0.1 | NA   | NA   | 0.0900  | 0.0900                |
| BENZO(a)ANTHRACENE      | 0.02  | 0.1  | NA   | NA   | 0.0600  | 0.0400                |
| CHRYSENE                | 0.03  | <0.1 | NA   | NA   | 0.0150  | 0.0150                |
| BENZO(b)FLUORANTHENE    | <0.05 | <0.2 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.05 | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.1  | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| PERYLENE                | <0.1  | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1  | <0.1 | NA   | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.2  | <0.5 | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.1  | <0.5 | NA   | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | 44.94 | 30.7 | -    | -    | 37.8200 | 7.1200                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A2-1     | A2-1      | A2-1     | A2-1      | Average  | Standard Deviation |
|------------------------------|----------|-----------|----------|-----------|----------|--------------------|
| SAMPLE DATE                  | 88/08/29 | 88/11/19  | 89/03/10 | 89/05/31  |          |                    |
| BAS REF NO.                  | 8809023  | 8811095-1 | 890377-3 | 8906045-3 |          |                    |
| SAMPLING LEVEL               | 2        | 1         | 1        | 1         |          |                    |
| pH                           | 7.28     | 8.07      | 8.24     | 9.02      | 8.1525   | 0.6181             |
| SPECIFIC CONDUCTANCE (µS/cm) | 340      | 560       | 560      | 620       | 520.0000 | 106.7708           |
| TEMPERATURE (C)              | 13       | 8         | 9        | 12        | 10.5000  | 2.0616             |
| DISSOLVED OXYGEN             | 5.2      | NA        | 5.6      | 6.8       | 5.8667   | 0.6799             |
| DIC                          | 36       | NA        | NA       | NA        | 36.0000  | 0.0000             |
| ALKALINITY                   | 116      | 135       | 127      | 119       | 124.2500 | 7.3951             |
| SULPHIDE                     | <0.05    | NA        | NA       | NA        | 0.0000   | 0.0000             |
| TOTAL CYANIDE                | NA       | NA        | NA       | NA        | -        | -                  |
| BROMIDE                      | <0.10    | 0.1       | <0.1     | 0.05      | 0.0375   | 0.0415             |
| CHLORIDE                     | 5        | 3.9       | 3.8      | 5.5       | 4.5500   | 0.7228             |
| FLUORIDE                     | 0.24     | 0.3       | 0.36     | 0.16      | 0.2650   | 0.0740             |
| SULPHATE                     | 83       | 105       | 87       | 114       | 97.2500  | 12.7353            |
| NITRATE-N                    | 0.02     | 0.24      | <0.02    | 0.01      | 0.0675   | 0.0998             |
| AMMONIA-N                    | NA       | NA        | NA       | NA        | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | 0.43     | NA        | NA       | NA        | 0.4300   | 0.0000             |
| TOTAL PHOSPHOROUS            | NA       | NA        | NA       | NA        | -        | -                  |
| DOC                          | 3.0      | 3.5/3.5   | 2.8/2.8  | 2.7/2.8   | 3.0125   | 0.2966             |
| PHENOLS                      | 0.003    | <0.001    | <0.001   | 0.001     | 0.0010   | 0.0012             |
| PCB (µg/L)                   | NA       | NA        | NA       | NA        | -        | -                  |
| OIL AND GREASE               | NA       | NA        | NA       | NA        | -        | -                  |
| ZINC                         | <0.01    | NA        | NA       | NA        | 0.0000   | 0.0000             |
| CADMIUM                      | 0.0010   | NA        | NA       | NA        | 0.0010   | 0.0000             |
| MANGANESE                    | 0.33     | NA        | NA       | NA        | 0.3300   | 0.0000             |
| COBALT                       | <0.01    | NA        | NA       | NA        | 0.0000   | 0.0000             |
| COPPER                       | 0.010    | NA        | NA       | NA        | 0.0100   | 0.0000             |
| IRON                         | 0.40     | NA        | NA       | NA        | 0.4000   | 0.0000             |
| LEAD                         | <0.05    | NA        | NA       | NA        | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01    | NA        | NA       | NA        | 0.0000   | 0.0000             |
| NICKEL                       | 0.01     | NA        | NA       | NA        | 0.0100   | 0.0000             |
| BERYLLIUM                    | <0.01    | NA        | NA       | NA        | 0.0000   | 0.0000             |
| MOLYBDENUM                   | 0.02     | NA        | NA       | NA        | 0.0200   | 0.0000             |
| CALCIUM                      | 41       | 53        | 48       | 45        | 46.7500  | 4.3804             |
| VANADIUM                     | 0.01     | NA        | NA       | NA        | 0.0100   | 0.0000             |
| ALUMINUM                     | 0.16     | NA        | NA       | NA        | 0.1600   | 0.0000             |
| MAGNESIUM                    | 8.5      | 8.5       | 7.4      | 8.6       | 8.2500   | 0.4924             |
| BARIUM                       | 0.04     | NA        | NA       | NA        | 0.0400   | 0.0000             |
| POTASSIUM                    | 11.3     | 7.8       | 8.6      | 9         | 9.1750   | 1.3007             |
| STRONTIUM                    | 0.56     | NA        | NA       | NA        | 0.5600   | 0.0000             |
| SODIUM                       | 23       | 32        | 31       | 34        | 30.0000  | 4.1833             |
| ARSENIC (µg/L)               | NA       | NA        | NA       | NA        | -        | -                  |
| SELENIUM (µg/L)              | NA       | NA        | NA       | NA        | -        | -                  |
| MERCURY (µg/L)               | NA       | NA        | NA       | NA        | -        | -                  |
| CATION EQUIVALENCE           | 4.07     | 4.94      | 4.57     | 4.66      |          |                    |
| ANION EQUIVALENCE            | 3.03     | 3.65      | 3.19     | 3.72      |          |                    |
| CHARGE BALANCE ERROR         | 14.63    | 14.99     | 17.85    | 11.27     |          |                    |
| BTX (µg/L)                   |          |           |          |           |          |                    |
| BENZENE                      | NA       | NA        | NA       | NA        | -        | -                  |
| TOLUENE                      | NA       | NA        | NA       | NA        | -        | -                  |
| XYLENE                       | NA       | NA        | NA       | NA        | -        | -                  |
| TOTAL BTX                    | -        | -         | -        | -         | -        | -                  |

## Appendix 6: Groundwater

| PIEZOMETER              | A2-1  | A2-1 | A2-1 | A2-1 | Average | Standard<br>Deviation |
|-------------------------|-------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |       |      |      |      |         |                       |
| NAPHTHALENE             | 0.02  | NA   | NA   | NA   | 0.0200  | 0.0000                |
| ACENAPHTHYLENE          | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| ACENAPHTHENE            | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| FLUORENE                | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| PHENANTHRENE            | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| ANTHRACENE              | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| FLUORANTHENE            | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| PYRENE                  | <0.01 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | <0.02 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| CHRYSENE                | <0.02 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | <0.05 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.05 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.05 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| PERYLENE                | <0.05 | NA   | NA   | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1  | NA   | NA   | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.2  | NA   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.1  | NA   | NA   | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | 0.02  | -    | -    | -    | 0.0200  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed



## Appendix 6: Groundwater

| PIEZOMETER                   | A2-2       | A2-2      | GWREPI<br>(A2-2) | A2-2      | A2-2      | Average   | Standard<br>Deviation |
|------------------------------|------------|-----------|------------------|-----------|-----------|-----------|-----------------------|
| SAMPLE DATE                  | 88/08/10   | 88/11/19  | 88/11/19         | 89/03/10  | 89/05/31  |           |                       |
| BAS REF NO.                  | 8808065-01 | 8811095-6 | 8811095-5        | 890377-4  | 8906045-4 |           |                       |
| SAMPLING LEVEL               | 2          | 2         | 2                | 1         | 1         |           |                       |
| pH                           | 6.40       | 6.33      | NA               | 6.47      | 6.72      | 6.4800    | 0.1471                |
| SPECIFIC CONDUCTANCE (µS/cm) | 860        | 1720      | NA               | 2230      | 2220      | 1757.5000 | 557.6906              |
| TEMPERATURE (C)              | 12         | 9         | NA               | 10        | 11        | 10.5000   | 1.1180                |
| DISSOLVED OXYGEN             | 3.8        | NA        | NA               | 1.4       | 0.3       | 1.3750    | 1.4939                |
| DIC                          | 40         | NA        | NA               | NA        | NA        | 40.0000   | 0.0000                |
| ALKALINITY                   | 108        | 131/131   | 131              | 118       | 120       | 121.6000  | 8.6856                |
| SULPHIDE                     | <0.05      | NA        | NA               | NA        | NA        | 0.0000    | 0.0000                |
| TOTAL CYANIDE                | NA         | 0.18      | 0.21             | NA        | NA        | 0.1950    | 0.0150                |
| BROMIDE                      | <0.20      | <0.5/<0.5 | <0.5             | 0.60/0.60 | <0.5      | 0.1200    | 0.2400                |
| CHLORIDE                     | 14.0       | 20/21     | 20               | 23/23     | 28        | 21.1000   | 4.5431                |
| FLUORIDE                     | 0.52       | 1.20/0.90 | 1.2              | 0.40/0.40 | 0.1       | 0.6540    | 0.4109                |
| SULPHATE                     | 540        | 680/670   | 670              | 700/700   | 850       | 687.0000  | 98.7725               |
| NITRATE-N                    | 0.24       | 4.1/4.1   | 4.5              | 3.4/3.4   | <0.1      | 2.4480    | 1.9346                |
| AMMONIA-N                    | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| TOTAL KJELDAHL NITROGEN      | 1.90       | NA        | NA               | NA        | NA        | 1.9000    | 0.0000                |
| TOTAL PHOSPHOROUS            | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| DOC                          | 15.5       | NA        | NA               | 24        | 27        | 22.1667   | 4.8705                |
| PHENOLS                      | 0.017      | 0.009     | 0.012            | 0.019     | NA        | 0.0143    | 0.0040                |
| PCB (µg/L)                   | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| OIL AND GREASE               | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| ZINC                         | 0.02       | NA        | NA               | NA        | NA        | 0.0200    | 0.0000                |
| CADMIUM                      | 0.0014     | NA        | NA               | NA        | NA        | 0.0014    | 0.0000                |
| MANGANESE                    | 3.3        | NA        | NA               | NA        | NA        | 3.3000    | 0.0000                |
| COBALT                       | 0.02       | NA        | NA               | NA        | NA        | 0.0200    | 0.0000                |
| COPPER                       | <0.005     | NA        | NA               | NA        | NA        | 0.0000    | 0.0000                |
| IRON                         | 15.5       | NA        | NA               | NA        | NA        | 15.5000   | 0.0000                |
| LEAD                         | <0.05      | NA        | NA               | NA        | NA        | 0.0000    | 0.0000                |
| CHROMIUM                     | 0.01       | NA        | NA               | NA        | NA        | 0.0100    | 0.0000                |
| NICKEL                       | 0.01       | NA        | NA               | NA        | NA        | 0.0100    | 0.0000                |
| BERYLLIUM                    | <0.01      | NA        | NA               | NA        | NA        | 0.0000    | 0.0000                |
| MOLYBDENUM                   | <0.02      | NA        | NA               | NA        | NA        | 0.0000    | 0.0000                |
| CALCIUM                      | 158        | 210       | 210              | 230       | 200       | 201.6000  | 23.8797               |
| VANADIUM                     | 0.02       | NA        | NA               | NA        | NA        | 0.0200    | 0.0000                |
| ALUMINUM                     | 0.20       | NA        | NA               | NA        | NA        | 0.2000    | 0.0000                |
| MAGNESIUM                    | 38         | 37        | 22               | 54        | 56        | 41.4000   | 12.4836               |
| BARIUM                       | 0.05       | NA        | NA               | NA        | NA        | 0.0500    | 0.0000                |
| POTASSIUM                    | 19.8       | 37/37     | 36               | 52        | 52        | 39.3600   | 11.9916               |
| STRONTIUM                    | 0.57       | NA        | NA               | NA        | NA        | 0.5700    | 0.0000                |
| SODIUM                       | 32         | 38/38     | 139              | 54        | 59        | 64.4000   | 38.5984               |
| ARSENIC (µg/L)               | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| SELENIUM (µg/L)              | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| MERCURY (µg/L)               | NA         | NA        | NA               | NA        | NA        | -         | -                     |
| CATION EQUIVALENCE           | 13.49      | 16.12     | 19.26            | 19.60     | 18.48     |           |                       |
| ANION EQUIVALENCE            | 12.72      | 16.01     | 15.90            | 16.46     | 19.69     |           |                       |
| CHARGE BALANCE ERROR         | 2.92       | 0.36      | 9.56             | 8.71      | -3.15     |           |                       |
| BTX (µg/L)                   |            |           |                  |           |           |           |                       |
| BENZENE                      | NA         | 177       | 200              | NA        | NA        | 0.1885    | 0.0115                |
| TOLUENE                      | NA         | 10        | 11               | NA        | NA        | 0.0105    | 0.0005                |
| XYLENE                       | NA         | 33        | 37               | NA        | NA        | 0.0350    | 0.0020                |
| TOTAL BTX                    | -          | 220       | 248              | -         | -         | 234.0000  | 14.0000               |

## Appendix 6: Groundwater

| PIEZOMETER              | A2-2  | A2-2 | GWREP1 | A2-2 | A2-2 | Average | Standard<br>Deviation |
|-------------------------|-------|------|--------|------|------|---------|-----------------------|
|                         |       |      | (A2-2) |      |      |         |                       |
| PAHs (µg/L)             |       |      |        |      |      |         |                       |
| NAPHTHALENE             | 50    | 7.6  | 13.4   | NA   | NA   | 23.6667 | 18.7704               |
| ACENAPHTHYLENE          | 0.79  | 1.9  | 1.9    | NA   | NA   | 1.5300  | 0.5233                |
| ACENAPHTHENE            | 0.24  | 0.8  | 0.8    | NA   | NA   | 0.6133  | 0.2640                |
| FLUORENE                | 0.15  | 0.4  | 0.4    | NA   | NA   | 0.3167  | 0.1179                |
| PHENANTHRENE            | 0.05  | 0.1  | 0.1    | NA   | NA   | 0.0833  | 0.0236                |
| ANTHRACENE              | 0.6   | 0.7  | 0.7    | NA   | NA   | 0.6667  | 0.0471                |
| FLUORANTHENE            | 0.06  | <0.1 | <0.1   | NA   | NA   | 0.0200  | 0.0283                |
| PYRENE                  | 0.03  | <0.1 | <0.1   | NA   | NA   | 0.0100  | 0.0141                |
| BENZO(a)ANTHRACENE      | 0.02  | <0.1 | <0.1   | NA   | NA   | 0.0067  | 0.0094                |
| CHRYSENE                | <0.02 | <0.1 | <0.1   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | <0.05 | <0.2 | <0.2   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.05 | <0.1 | <0.1   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.05 | <0.1 | <0.1   | NA   | NA   | 0.0000  | 0.0000                |
| PERYLENE                | <0.05 | <0.1 | <0.1   | NA   | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.05 | <0.1 | <0.1   | NA   | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.1  | <0.5 | <0.5   | NA   | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.05 | <0.5 | <0.5   | NA   | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | 51.94 | 11.5 | 17.3   | -    | -    | 20.1850 | 19.3621               |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   |            |           |            |            | Average  | Standard Deviation |
|------------------------------|------------|-----------|------------|------------|----------|--------------------|
|                              | A3         | A3        | A3         | A3         |          |                    |
| SAMPLE DATE                  | 88/08/30   | 88/11/17  | 89/03/08   | 89/05/31   |          |                    |
| BAS REF NO.                  | 8809032-06 | 8811092-1 | Not        | Not        |          |                    |
| SAMPLING LEVEL               | 1          | 1         | Accessible | Accessible |          |                    |
| pH                           | 8.61       | 8.79      |            |            | 8.7000   | 0.0900             |
| SPECIFIC CONDUCTANCE (µS/cm) | 180        | 190       |            |            | 185.0000 | 5.0000             |
| TEMPERATURE (C)              | 12         | 8         |            |            | 10.0000  | 2.0000             |
| DISSOLVED OXYGEN             | 3.6        | NA        |            |            | 1.8000   | 1.8000             |
| DIC                          | NA         | NA        |            |            | -        | -                  |
| ALKALINITY                   | NA         | 87        |            |            | 87.0000  | 0.0000             |
| SULPHIDE                     | NA         | NA        |            |            | -        | -                  |
| TOTAL CYANIDE                | NA         | NA        |            |            | -        | -                  |
| BROMIDE                      | <0.1       | <0.05     |            |            | 0.0000   | 0.0000             |
| CHLORIDE                     | 1.14       | 1.32/1.23 |            |            | 1.2075   | 0.0675             |
| FLUORIDE                     | 0.05       | 0.28/0.28 |            |            | 0.1650   | 0.1150             |
| SULPHATE                     | 2.3        | 2.3/2.3   |            |            | 2.3000   | 0.0000             |
| NITRATE-N                    | <0.01      | <0.01     |            |            | 0.0000   | 0.0000             |
| AMMONIA-N                    | NA         | NA        |            |            | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        |            |            | -        | -                  |
| TOTAL PHOSPHOROUS            | NA         | NA        |            |            | -        | -                  |
| DOC                          | 2.5        | 1.0/1.0   |            |            | 1.7500   | 0.7500             |
| PHENOLS                      | <0.001     | <0.001    |            |            | 0.0000   | 0.0000             |
| PCB (µg/L)                   | NA         | NA        |            |            | -        | -                  |
| OIL AND GREASE               | <1         | NA        |            |            | 0.0000   | 0.0000             |
| ZINC                         | <0.01      | NA        |            |            | 0.0000   | 0.0000             |
| CADMIUM                      | 0.0010     | NA        |            |            | 0.0010   | 0.0000             |
| MANGANESE                    | 0.10       | NA        |            |            | 0.1000   | 0.0000             |
| COBALT                       | <0.01      | NA        |            |            | 0.0000   | 0.0000             |
| COPPER                       | 0.005      | NA        |            |            | 0.0050   | 0.0000             |
| IRON                         | 0.20       | NA        |            |            | 0.2000   | 0.0000             |
| LEAD                         | <0.05      | NA        |            |            | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | NA        |            |            | 0.0000   | 0.0000             |
| NICKEL                       | <0.01      | NA        |            |            | 0.0000   | 0.0000             |
| BERYLLIUM                    | NA         | NA        |            |            | -        | -                  |
| MOLYBDENUM                   | NA         | NA        |            |            | -        | -                  |
| CALCIUM                      | NA         | 15.2      |            |            | 15.2000  | 0.0000             |
| VANADIUM                     | NA         | NA        |            |            | -        | -                  |
| ALUMINUM                     | NA         | NA        |            |            | -        | -                  |
| MAGNESIUM                    | NA         | 2         |            |            | 2.0000   | 0.0000             |
| BARIUM                       | NA         | NA        |            |            | -        | -                  |
| POTASSIUM                    | NA         | 1.65      |            |            | 1.6500   | 0.0000             |
| STRONTIUM                    | NA         | NA        |            |            | -        | -                  |
| SODIUM                       | NA         | 15        |            |            | 15.0000  | 0.0000             |
| ARSENIC (µg/L)               | NA         | NA        |            |            | -        | -                  |
| SELENIUM (µg/L)              | NA         | NA        |            |            | -        | -                  |
| MERCURY (µg/L)               | NA         | NA        |            |            | -        | -                  |
| CATION EQUIVALENCE           | 0.01       | 1.62      |            |            |          |                    |
| ANION EQUIVALENCE            | 0.08       | 0.95      |            |            |          |                    |
| CHARGE BALANCE ERROR         | -83.57     | 25.85     |            |            |          |                    |
| BTX (µg/L)                   |            |           |            |            |          |                    |
| BENZENE                      | NA         | NA        |            |            | -        | -                  |
| TOLUENE                      | NA         | NA        |            |            | -        | -                  |
| XYLENE                       | NA         | NA        |            |            | -        | -                  |
| TOTAL BTX                    | -          | -         |            |            | -        | -                  |

## Appendix 6: Groundwater

| PIEZOMETER              | A3 | A3 | A3 | A3 | Average | Standard<br>Deviation |
|-------------------------|----|----|----|----|---------|-----------------------|
| PAHs (µg/L)             |    |    |    |    |         |                       |
| NAPHTHALENE             | NA | NA |    |    | -       | -                     |
| ACENAPHTHYLENE          | NA | NA |    |    | -       | -                     |
| ACENAPHTHENE            | NA | NA |    |    | -       | -                     |
| FLUORENE                | NA | NA |    |    | -       | -                     |
| PHENANTHRENE            | NA | NA |    |    | -       | -                     |
| ANTHRACENE              | NA | NA |    |    | -       | -                     |
| FLUORANTHENE            | NA | NA |    |    | -       | -                     |
| PYRENE                  | NA | NA |    |    | -       | -                     |
| BENZO(a)ANTHRACENE      | NA | NA |    |    | -       | -                     |
| CHRYSENE                | NA | NA |    |    | -       | -                     |
| BENZO(b)FLUORANTHENE    | NA | NA |    |    | -       | -                     |
| BENZO(k)FLUORANTHENE    | NA | NA |    |    | -       | -                     |
| BENZO(a)PYRENE          | NA | NA |    |    | -       | -                     |
| PERYLENE                | NA | NA |    |    | -       | -                     |
| INDENO(1,2,3-C,D)PYRENE | NA | NA |    |    | -       | -                     |
| DIBENZO(a,h)ANTHRACENE  | NA | NA |    |    | -       | -                     |
| BENZO(g,h,i)PERYLENE    | NA | NA |    |    | -       | -                     |
| TOTAL PAHs              | -  | -  |    |    | -       | -                     |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A4-1       | A4-1      | A4-1     | A4-1       | Average  | Standard Deviation |
|------------------------------|------------|-----------|----------|------------|----------|--------------------|
| SAMPLE DATE                  | 88/08/31   | 88/11/20  | 89/03/10 | 89/05/31   |          |                    |
| BAS REF NO.                  | 8809031-03 | 8811120-1 | 890377-8 | 8906045-12 |          |                    |
| SAMPLING LEVEL               | 1          | 1         | 2+       | 2+         |          |                    |
| pH                           | 8.92       | 9.14      | 10.81    | 9.54       | 9.6025   | 0.7317             |
| SPECIFIC CONDUCTANCE (µS/cm) | 150        | 180       | 400      | 230        | 240.0000 | 96.6954            |
| TEMPERATURE (C)              | 10.5       | 7         | 6        | 10         | 8.3750   | 1.9162             |
| DISSOLVED OXYGEN             | 2.4        | NA        | 4.0      | 3.6        | 2.5000   | 1.5588             |
| DIC                          | NA         | NA        | NA       | NA         | -        | -                  |
| ALKALINITY                   | NA         | 82        | 80       | 78         | 80.0000  | 1.6330             |
| SULPHIDE                     | NA         | NA        | NA       | NA         | -        | -                  |
| TOTAL CYANIDE                | NA         | NA        | <0.005   | <0.002     | 0.0000   | 0.0000             |
| BROMIDE                      | <0.1       | <0.05     | <0.05    | <0.05      | 0.0000   | 0.0000             |
| CHLORIDE                     | 3.0        | 2.6       | 4        | 2          | 2.9000   | 0.7280             |
| FLUORIDE                     | 0.38       | 0.43      | 0.34     | 0.31       | 0.3650   | 0.0450             |
| SULPHATE                     | 9.2        | 9         | 4.1      | 3.9        | 6.5500   | 2.5520             |
| NITRATE-N                    | <0.02      | <0.01     | 0.01     | <0.1       | 0.0025   | 0.0043             |
| AMMONIA-N                    | NA         | NA        | NA       | NA         | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 0.14     | NA         | 0.1400   | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        | 0.053    | NA         | 0.0530   | 0.0000             |
| DOC                          | 1.5        | 2         | NA       | 1          | 1.5000   | 0.4082             |
| PHENOLS                      | <0.001     | 0.001     | 0.004    | 0.001      | 0.0005   | 0.0005             |
| PCB (µg/L)                   | NA         | NA        | NA       | NA         | -        | -                  |
| OIL AND GREASE               | <1         | NA        | NA       | NA         | 0.0000   | 0.0000             |
| ZINC                         | <0.01      | NA        | <0.01    | 0.01       | 0.0033   | 0.0047             |
| CADMIUM                      | 0.0002     | NA        | <0.005   | <0.005     | 0.0001   | 0.0001             |
| MANGANESE                    | 0.02       | NA        | 0.01     | 0.02       | 0.0167   | 0.0047             |
| COBALT                       | <0.01      | NA        | <0.01    | <0.01      | 0.0000   | 0.0000             |
| COPPER                       | 0.005      | NA        | <0.005   | 0.015      | 0.0067   | 0.0062             |
| IRON                         | 0.28       | NA        | 0.16     | 0.36       | 0.2667   | 0.0822             |
| LEAD                         | <0.05      | NA        | <0.05    | <0.05      | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | NA        | <0.01    | <0.01      | 0.0000   | 0.0000             |
| NICKEL                       | <0.01      | NA        | <0.01    | <0.01      | 0.0000   | 0.0000             |
| BERYLLIUM                    | NA         | NA        | <0.01    | <0.01      | 0.0000   | 0.0000             |
| MOLYBDENUM                   | NA         | NA        | <0.02    | 0.01       | 0.0050   | 0.0050             |
| CALCIUM                      | NA         | 10.8      | 11.2     | 10.5       | 10.8333  | 0.2867             |
| VANADIUM                     | NA         | NA        | <0.01    | <0.01      | 0.0000   | 0.0000             |
| ALUMINUM                     | NA         | NA        | 0.18     | 0.52       | 0.3500   | 0.1700             |
| MAGNESIUM                    | NA         | 1.35      | 1.00     | 1.3        | 1.2167   | 0.1546             |
| BARIUM                       | NA         | NA        | 0.02     | 0.01       | 0.0150   | 0.0050             |
| POTASSIUM                    | NA         | 2.2       | 2.9      | 2.8        | 2.6333   | 0.3091             |
| STRONTIUM                    | NA         | NA        | 0.21     | 0.17       | 0.1900   | 0.0200             |
| SODIUM                       | NA         | 26        | 22       | 24         | 24.0000  | 1.6330             |
| ARSENIC (µg/L)               | NA         | NA        | NA       | NA         | -        | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA       | NA         | -        | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA       | NA         | -        | -                  |
| CATION EQUIVALENCE           | 0.01       | 1.84      | 1.70     | 1.82       |          |                    |
| ANION EQUIVALENCE            | 0.28       | 1.08      | 1.00     | 0.92       |          |                    |
| CHARGE BALANCE ERROR         | -92.99     | 25.96     | 25.98    | 32.93      |          |                    |
| BTX (µg/L)                   |            |           |          |            |          |                    |
| BENZENE                      | NA         | NA        | 12       | NA         | 12.0000  | 0.0000             |
| TOLUENE                      | NA         | NA        | 24       | NA         | 24.0000  | 0.0000             |
| XYLENE                       | NA         | NA        | <10      | NA         | 0.0000   | 0.0000             |
| TOTAL BTX                    | -          | -         | 36       | -          | 36.0000  | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A4-1 | A4-1 | A4-1 | A4-1 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| FLUORENE                | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| ANTHRACENE              | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| PYRENE                  | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | NA   | <0.2 | <0.2 | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | NA   | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA   | NA   | <0.1 | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | NA   | <0.1 | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | NA   | <0.5 | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | NA   | <0.5 | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | -    | 0    | 0    | 0.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A4-2       | A4-2      | A4-2     | A4-2       | Average  | Standard Deviation |
|------------------------------|------------|-----------|----------|------------|----------|--------------------|
| SAMPLE DATE                  | 88/08/30   | 88/11/20  | 89/03/10 | 89/05/31   |          |                    |
| BAS REF NO.                  | 8809032-07 | 8811120-2 | FROZEN   | 8906045-13 |          |                    |
| SAMPLING LEVEL               | 1          | 1         |          | 2+         |          |                    |
| pH                           | 6.93       | 7.16      |          | 7.57       | 7.2200   | 0.2647             |
| SPECIFIC CONDUCTANCE (µS/cm) | 610        | 570       |          | 540        | 573.3333 | 28.6744            |
| TEMPERATURE (C)              | 12         | 8         |          | 10         | 10.0000  | 1.6330             |
| DISSOLVED OXYGEN             | 3.6        | NA        |          | 4.5        | 4.0500   | 0.4500             |
| DIC                          | NA         | NA        |          | NA         | -        | -                  |
| ALKALINITY                   | NA         | 99        |          | 88         | 93.5000  | 5.5000             |
| SULPHIDE                     | NA         | NA        |          | NA         | -        | -                  |
| TOTAL CYANIDE                | NA         | NA        |          | <0.002     | 0.0000   | 0.0000             |
| BROMIDE                      | <0.5/<0.5  | <0.1      |          | 0.24       | 0.0800   | 0.1131             |
| CHLORIDE                     | 40/37      | 21        |          | 24         | 27.8333  | 7.6413             |
| FLUORIDE                     | 0.08/0.12  | 0.46      |          | 0.2        | 0.2533   | 0.1517             |
| SULPHATE                     | 132/126    | 103       |          | 81         | 104.3333 | 19.6186            |
| NITRATE-N                    | 0.08       | 0.04      |          | <0.02      | 0.0400   | 0.0327             |
| AMMONIA-N                    | NA         | NA        |          | NA         | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        |          | 0.39       | 0.3900   | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        |          | <0.001     | 0.0000   | 0.0000             |
| DOC                          | 6.0        | 6.5       |          | 5.1        | 5.8667   | 0.5793             |
| PHENOLS                      | 0.002      | 0.001     |          | <0.001     | 0.0010   | 0.0008             |
| PCB (µg/L)                   | NA         | NA        |          | NA         | -        | -                  |
| OIL AND GREASE               | <1         | NA        |          | NA         | 0.0000   | 0.0000             |
| ZINC                         | 0.01       | NA        |          | 0.02       | 0.0150   | 0.0050             |
| CADMIUM                      | 0.0002     | NA        |          | <0.005     | 0.0001   | 0.0001             |
| MANGANESE                    | 0.62       | NA        |          | 1          | 0.8100   | 0.1900             |
| COBALT                       | <0.01      | NA        |          | 0.01       | 0.0050   | 0.0050             |
| COPPER                       | <0.005     | NA        |          | <0.005     | 0.0000   | 0.0000             |
| IRON                         | 6.0        | NA        |          | 14.3       | 10.1500  | 4.1500             |
| LEAD                         | <0.05      | NA        |          | <0.05      | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | NA        |          | 0.02       | 0.0100   | 0.0100             |
| NICKEL                       | <0.01      | NA        |          | <0.01      | 0.0000   | 0.0000             |
| BERYLLIUM                    | NA         | NA        |          | <0.01      | 0.0000   | 0.0000             |
| MOLYBDENUM                   | NA         | NA        |          | 0.01       | 0.0100   | 0.0000             |
| CALCIUM                      | NA         | 52        |          | 41         | 46.5000  | 5.5000             |
| VANADIUM                     | NA         | NA        |          | <0.01      | 0.0000   | 0.0000             |
| ALUMINUM                     | NA         | NA        |          | 0.12       | 0.1200   | 0.0000             |
| MAGNESIUM                    | NA         | 12.2      |          | 11.5       | 11.8500  | 0.3500             |
| BARIUM                       | NA         | NA        |          | 0.03       | 0.0300   | 0.0000             |
| POTASSIUM                    | NA         | 6.1       |          | 4.8        | 5.4500   | 0.6500             |
| STRONTIUM                    | NA         | NA        |          | 0.45       | 0.4500   | 0.0000             |
| SODIUM                       | NA         | 21        |          | 22         | 21.5000  | 0.5000             |
| ARSENIC (µg/L)               | NA         | NA        |          | NA         | -        | -                  |
| SELENIUM (µg/L)              | NA         | NA        |          | NA         | -        | -                  |
| MERCURY (µg/L)               | NA         | NA        |          | NA         | -        | -                  |
| CATION EQUIVALENCE           | 0.21       | 4.67      |          | 4.60       |          |                    |
| ANION EQUIVALENCE            | 3.77       | 3.73      |          | 3.24       |          |                    |
| CHARGE BALANCE ERROR         | -89.22     | 11.21     |          | 17.28      |          |                    |
| BTX (µg/L)                   |            |           |          |            |          |                    |
| BENZENE                      | NA         | NA        |          | <2         | 0.0000   | 0.0000             |
| TOLUENE                      | NA         | NA        |          | <1         | 0.0000   | 0.0000             |
| XYLENE                       | NA         | NA        |          | <2         | 0.0000   | 0.0000             |
| TOTAL BTX                    | -          | -         |          | 0          | 0.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A4-2 | A4-2 | A4-2 | A4-2 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| FLUORENE                | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| ANTHRACENE              | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA   | NA   |      | <0.1 | 0.0000  | 0.0000                |
| PYRENE                  | NA   | NA   |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA   | NA   |      | <0.2 | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | NA   |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | NA   |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | NA   |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | NA   |      | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA   | NA   |      | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | NA   |      | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | NA   |      | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | NA   |      | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | -    |      | 0    | 0.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed



## Appendix 6: Groundwater

| PIEZOMETER                   | A5         | A5        | A5        | A5        | Average   | Standard Deviation |
|------------------------------|------------|-----------|-----------|-----------|-----------|--------------------|
| SAMPLE DATE                  | 88/08/10   | 88/11/18  | 89/03/09  | 89/05/30  |           |                    |
| BAS REF NO.                  | 8808065-02 | 8811095-4 | 8903072-2 | 8906008-4 |           |                    |
| SAMPLING LEVEL               | 2          | 2         | 2+        | 2+        |           |                    |
| pH                           | 11.84      | 12.09     | 11.07     | 12.34     | 11.8350   | 0.4757             |
| SPECIFIC CONDUCTANCE (µS/cm) | 1050       | 1730      | 600       | 960       | 1085.0000 | 408.6869           |
| TEMPERATURE (C)              | 11.5       | 9         | 7         | 10        | 9.3750    | 1.6346             |
| DISSOLVED OXYGEN             | 5.5        | NA        | 3.0       | 2.75      | 3.7500    | 1.2416             |
| DIC                          | 11         | NA        | NA        | NA        | 11.0000   | 0.0000             |
| ALKALINITY                   | 550        | 240       | 189       | 230       | 302.2500  | 144.3093           |
| SULPHIDE                     | <0.05      | NA        | NA        | 0.1/0.1   | 0.0500    | 0.0500             |
| TOTAL CYANIDE                | NA         | 0.008     | 0.015     | <0.002    | 0.0077    | 0.0061             |
| BROMIDE                      | <0.50      | <0.2      | 0.14      | 0.1/0.1   | 0.0600    | 0.0616             |
| CHLORIDE                     | 18.3       | 15.6      | 17.0      | 17.4/17.8 | 17.1250   | 0.9934             |
| FLUORIDE                     | 0.90       | 0.36      | 0.79      | 0.18/0.22 | 0.5625    | 0.2907             |
| SULPHATE                     | 22         | 5.2       | 2.9       | 6.4       | 9.1250    | 7.5390             |
| NITRATE-N                    | 0.20       | 0.04      | <0.1      | 0.04/0.04 | 0.0700    | 0.0768             |
| AMMONIA-N                    | NA         | NA        | NA        | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | 18.2       | NA        | NA        | 16.1      | 17.1500   | 1.0500             |
| TOTAL PHOSPHOROUS            | NA         | NA        | NA        | 0.103     | 0.1030    | 0.0000             |
| DOC                          | 35/35      | NA        | NA        | 40        | 37.5000   | 2.5000             |
| PHENOLS                      | 0.140      | 0.125     | 0.143     | 0.125     | 0.1333    | 0.0083             |
| PCB (µg/L)                   | NA         | NA        | NA        | NA        | -         | -                  |
| OIL AND GREASE               | NA         | NA        | NA        | NA        | -         | -                  |
| ZINC                         | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| CADMIUM                      | 0.0005     | NA        | <0.005    | <0.005    | 0.0002    | 0.0002             |
| MANGANESE                    | 0.01       | NA        | 0.12      | 0.08      | 0.0700    | 0.0455             |
| COBALT                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| COPPER                       | 0.010      | NA        | <0.005    | 0.01      | 0.0067    | 0.0047             |
| IRON                         | 0.04       | NA        | 0.98      | 0.72      | 0.5800    | 0.3963             |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.01       | NA        | <0.01     | <0.01     | 0.0033    | 0.0047             |
| NICKEL                       | 0.01       | NA        | <0.01     | <0.01     | 0.0033    | 0.0047             |
| BERYLLIUM                    | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | 0.04       | NA        | <0.02     | 0.02      | 0.0200    | 0.0163             |
| CALCIUM                      | 136        | 98        | 82        | 89        | 101.2500  | 20.8492            |
| VANADIUM                     | 0.03       | NA        | 0.02      | 0.02      | 0.0233    | 0.0047             |
| ALUMINUM                     | 0.54       | NA        | 0.64      | 0.5       | 0.5600    | 0.0589             |
| MAGNESIUM                    | 0.15       | 2.2       | 4.7       | 1.15      | 2.0500    | 1.6930             |
| BARIUM                       | 0.05       | NA        | 0.05      | 0.04      | 0.0467    | 0.0047             |
| POTASSIUM                    | 10.8       | 8.4       | 10.2      | 9.4       | 9.7000    | 0.9000             |
| STRONTIUM                    | 0.50       | NA        | 0.26      | 0.2       | 0.3200    | 0.1296             |
| SODIUM                       | 90         | 50        | 54        | 51        | 61.2500   | 16.6640            |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA        | -         | -                  |
| CATION EQUIVALENCE           | 11.05      | 7.46      | 7.19      | 7.08      |           |                    |
| ANION EQUIVALENCE            | 6.47       | 2.95      | 2.43      | 2.93      |           |                    |
| CHARGE BALANCE ERROR         | 26.13      | 43.37     | 49.53     | 41.46     |           |                    |
| BTX (µg/L)                   |            |           |           |           |           |                    |
| BENZENE                      | NA         | <2        | NA        | NA        | 0.0000    | 0.0000             |
| TOLUENE                      | NA         | <17       | NA        | NA        | 0.0000    | 0.0000             |
| XYLENE                       | NA         | <2        | NA        | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | 0         | -         | -         | 0.0000    | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A5    | A5   | A5   | A5 | Average | Standard<br>Deviation |
|-------------------------|-------|------|------|----|---------|-----------------------|
| PAHs (µg/L)             |       |      |      |    |         |                       |
| NAPHTHALENE             | 9.1   | 7.3  | 6.0  | NA | 7.4667  | 1.2710                |
| ACENAPHTHYLENE          | 0.05  | <0.1 | <0.1 | NA | 0.0167  | 0.0236                |
| ACENAPHTHENE            | 0.15  | 0.2  | 0.2  | NA | 0.1833  | 0.0236                |
| FLUORENE                | 0.1   | 0.1  | 0.1  | NA | 0.1000  | 0.0000                |
| PHENANTHRENE            | 3.46  | 2.9  | 2.9  | NA | 3.0867  | 0.2640                |
| ANTHRACENE              | 0.13  | 0.1  | 0.1  | NA | 0.1100  | 0.0141                |
| FLUORANTHENE            | 0.81  | 0.6  | 0.9  | NA | 0.7700  | 0.1257                |
| PYRENE                  | 0.47  | 0.4  | 0.6  | NA | 0.4900  | 0.0829                |
| BENZO(a)ANTHRACENE      | <0.02 | <0.1 | <0.1 | NA | 0.0000  | 0.0000                |
| CHRYSENE                | <0.02 | <0.1 | 0.1  | NA | 0.0333  | 0.0471                |
| BENZO(b)FLUORANTHENE    | <0.05 | <0.2 | <0.2 | NA | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.05 | <0.1 | <0.1 | NA | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.05 | <0.1 | <0.1 | NA | 0.0000  | 0.0000                |
| PERYLENE                | <0.05 | <0.1 | <0.1 | NA | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1  | <0.1 | <0.1 | NA | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.2  | <0.5 | <0.5 | NA | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.1  | <0.5 | <0.5 | NA | 0.0000  | 0.0000                |
| TOTAL PAHs              | 14.27 | 11.6 | 10.9 | -  | 12.2567 | 1.4520                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A6         | A6        | A6        | A6        | Average  | Standard Deviation |
|------------------------------|------------|-----------|-----------|-----------|----------|--------------------|
| SAMPLE DATE                  | 88/08/10   | 88/11/20  | 89/03/09  | 89/05/30  |          |                    |
| BAS REF NO.                  | 8808064-01 | 8811120-3 | 8903072-8 | 8906008-6 |          |                    |
| SAMPLING LEVEL               | 1          | 1         | 2+        | 2+        |          |                    |
| pH                           | 9.20       | 8.78      | 8.58      | 9.02      | 8.8950   | 0.2351             |
| SPECIFIC CONDUCTANCE (µS/cm) | 230        | 360       | 480       | 260       | 332.5000 | 97.8200            |
| TEMPERATURE (C)              | 12         | 10        | 7         | 9         | 9.5000   | 1.8028             |
| DISSOLVED OXYGEN             | 3.7        | NA        | 0.65      | 3.7       | 2.6833   | 1.4378             |
| DIC                          | NA         | NA        | NA        | NA        | -        | -                  |
| ALKALINITY                   | NA         | 143       | 158/157   | 154       | 151.5000 | 6.1779             |
| SULPHIDE                     | NA         | NA        | NA        | NA        | -        | -                  |
| TOTAL CYANIDE                | NA         | NA        | <0.005    | <0.002    | 0.0000   | 0.0000             |
| BROMIDE                      | 0.06       | <0.05     | 0.06      | 0.05      | 0.0425   | 0.0249             |
| CHLORIDE                     | 11         | 10.1      | 12.5      | 10.7      | 11.0750  | 0.8842             |
| FLUORIDE                     | 0.25       | 0.05      | 0.16      | 0.26      | 0.1800   | 0.0846             |
| SULPHATE                     | 19         | 9.2       | 10.3      | 10        | 12.1250  | 3.9896             |
| NITRATE-N                    | 0.06       | 0.01      | <0.01     | <0.01     | 0.0175   | 0.0249             |
| AMMONIA-N                    | NA         | NA        | NA        | NA        | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 0.55      | NA        | 0.5500   | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        | 0.044     | NA        | 0.0440   | 0.0000             |
| DOC                          | 7.0        | 5.5       | NA        | 6         | 6.1667   | 0.6236             |
| PHENOLS                      | 0.003      | 0.002     | 0.001     | 0.003     | 0.0018   | 0.0013             |
| PCB (µg/L)                   | NA         | NA        | NA        | NA        | -        | -                  |
| OIL AND GREASE               | 3          | NA        | NA        | NA        | 3.0000   | 0.0000             |
| ZINC                         | <0.01      | NA        | 0.01      | <0.01     | 0.0033   | 0.0047             |
| CADMIUM                      | 0.0004     | NA        | <0.005    | <0.005    | 0.0001   | 0.0002             |
| MANGANESE                    | <0.01      | NA        | 0.17      | 0.17      | 0.1133   | 0.0801             |
| COBALT                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| COPPER                       | 0.005      | NA        | <0.005    | 0.01      | 0.0050   | 0.0041             |
| IRON                         | 0.02/0.02  | NA        | 0.04      | 0.08      | 0.0400   | 0.0327             |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05     | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| NICKEL                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| BERYLLIUM                    | NA         | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| MOLYBDENUM                   | NA         | NA        | <0.02     | <0.02     | 0.0000   | 0.0000             |
| CALCIUM                      | NA         | 46        | 60        | 59        | 55.0000  | 6.3770             |
| VANADIUM                     | NA         | NA        | 0.01      | 0.01      | 0.0100   | 0.0000             |
| ALUMINUM                     | NA         | NA        | 0.08      | 0.14      | 0.1100   | 0.0300             |
| MAGNESIUM                    | NA         | 8.1       | 9.0       | 9.5       | 8.8667   | 0.5793             |
| BARIUM                       | NA         | NA        | 0.04      | 0.04      | 0.0400   | 0.0000             |
| POTASSIUM                    | NA         | 1.75      | 1.65      | 2.2       | 1.8667   | 0.2392             |
| STRONTIUM                    | NA         | NA        | 0.2       | 0.19      | 0.1950   | 0.0050             |
| SODIUM                       | NA         | 8         | 7.5       | 9         | 8.1667   | 0.6236             |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA        | -        | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA        | -        | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA        | -        | -                  |
| CATION EQUIVALENCE           | 0.00       | 3.35      | 4.11      | 4.19      |          |                    |
| ANION EQUIVALENCE            | 0.71       | 1.91      | 2.14      | 2.05      |          |                    |
| CHARGE BALANCE ERROR         | -99.80     | 27.55     | 31.54     | 34.34     |          |                    |
| BTX (µg/L)                   |            |           |           |           |          |                    |
| BENZENE                      | NA         | NA        | <10       | NA        | 0.0000   | 0.0000             |
| TOLUENE                      | NA         | NA        | <10       | NA        | 0.0000   | 0.0000             |
| XYLENE                       | NA         | NA        | <10       | NA        | 0.0000   | 0.0000             |
| TOTAL BTX                    | -          | -         | 0         | -         | 0.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A6 | A6 | A6   | A6   | Average | Standard<br>Deviation |
|-------------------------|----|----|------|------|---------|-----------------------|
| PAHs (µg/L)             |    |    |      |      |         |                       |
| NAPHTHALENE             | NA | NA | <0.1 | 2.3  | 1.1500  | 1.1500                |
| ACENAPHTHYLENE          | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| FLUORENE                | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA | NA | 0.1  | 1.7  | 0.9000  | 0.8000                |
| ANTHRACENE              | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA | NA | 0.1  | 1.9  | 1.0000  | 0.9000                |
| PYRENE                  | NA | NA | <0.1 | 1    | 0.5000  | 0.5000                |
| BENZO(a)ANTHRACENE      | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| CHRYSENE                | NA | NA | <0.1 | 0.6  | 0.3000  | 0.3000                |
| BENZO(b)FLUORANTHENE    | NA | NA | <0.2 | 0.7  | 0.3500  | 0.3500                |
| BENZO(k)FLUORANTHENE    | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -  | -  | 0.2  | 8.2  | 2.1000  | 3.5228                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A7-1       | A7-1      | A7-1     | A7-1      | Average  | Standard Deviation |
|------------------------------|------------|-----------|----------|-----------|----------|--------------------|
| SAMPLE DATE                  | 88/08/31   | 88/11/20  | 89/03/09 | 89/05/31  |          |                    |
| BAS REF NO.                  | 8809031-02 | 8811092-9 | FROZEN   | 8906046-3 |          |                    |
| SAMPLING LEVEL               | 1          | 3         |          | 3         |          |                    |
| pH                           | 7.85       | 9.39      |          | 8.63      | 8.6233   | 0.6287             |
| SPECIFIC CONDUCTANCE (µS/cm) | 180        | 190       |          | 210       | 193.3333 | 12.4722            |
| TEMPERATURE (C)              | NA         | 8         |          | 9         | 10.3333  | 2.6247             |
| DISSOLVED OXYGEN             | NA         | NA        |          | 6.5       | 6.5000   | 0.0000             |
| DIC                          | NA         | 9         |          | 13.2      | 11.1000  | 2.1000             |
| ALKALINITY                   | NA         | 41        |          | 49/49     | 45.0000  | 4.0000             |
| SULPHIDE                     | NA         | NA        |          | <0.05     | 0.0000   | 0.0000             |
| TOTAL CYANIDE                | NA         | <0.002    |          | <0.002    | 0.0000   | 0.0000             |
| BROMIDE                      | <0.1/<0.1  | <0.05     |          | <0.05     | 0.0000   | 0.0000             |
| CHLORIDE                     | 11.6/11.0  | 11.5      |          | 14.1/14.1 | 12.3000  | 1.2754             |
| FLUORIDE                     | 0.06/0.04  | 0.121     |          | 0.03/0.05 | 0.0703   | 0.0361             |
| SULPHATE                     | 11.4/11.0  | 11.1      |          | 9.5/9.0   | 10.5167  | 0.8966             |
| NITRATE-N                    | 0.32/0.32  | <0.01     |          | 0.68/0.68 | 0.3333   | 0.2778             |
| AMMONIA-N                    | NA         | 0.55/0.56 |          | 0.037     | 0.2960   | 0.2590             |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        |          | <0.02     | 0.0000   | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        |          | <0.001    | 0.0000   | 0.0000             |
| DOC                          | <0.05      | 0.5       |          | <0.5/<0.5 | 0.1667   | 0.2357             |
| PHENOLS                      | <0.001     | <0.001    |          | <0.001    | 0.0000   | 0.0000             |
| PCB (µg/L)                   | NA         | <0.02     |          | <0.02     | 0.0000   | 0.0000             |
| OIL AND GREASE               | <1         | NA        |          | NA        | 0.0000   | 0.0000             |
| ZINC                         | 0.01/0.01  | <0.01     |          | <0.01     | 0.0033   | 0.0047             |
| CADMIUM                      | 0.0008     | <0.005    |          | <0.005    | 0.0003   | 0.0004             |
| MANGANESE                    | 0.11/0.11  | 0.11      |          | 0.02      | 0.0800   | 0.0424             |
| COBALT                       | <0.01      | <0.01     |          | <0.01     | 0.0000   | 0.0000             |
| COPPER                       | <0.005     | <0.005    |          | <0.005    | 0.0000   | 0.0000             |
| IRON                         | 0.14/0.14  | 0.04      |          | 0.34      | 0.1733   | 0.1247             |
| LEAD                         | <0.05      | <0.05     |          | <0.05     | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | <0.01     |          | <0.01     | 0.0000   | 0.0000             |
| NICKEL                       | <0.01      | <0.01     |          | <0.01     | 0.0000   | 0.0000             |
| BERYLLIUM                    | NA         | <0.01     |          | <0.01     | 0.0000   | 0.0000             |
| MOLYBDENUM                   | NA         | <0.02     |          | <0.02     | 0.0000   | 0.0000             |
| CALCIUM                      | NA         | 15.9      |          | 21        | 18.4500  | 2.5500             |
| VANADIUM                     | NA         | <0.01     |          | <0.01     | 0.0000   | 0.0000             |
| ALUMINUM                     | NA         | 0.02      |          | 0.04      | 0.0300   | 0.0100             |
| MAGNESIUM                    | NA         | 4.1       |          | 4.6       | 4.3500   | 0.2500             |
| BARIUM                       | NA         | 0.01      |          | 0.02      | 0.0150   | 0.0050             |
| POTASSIUM                    | NA         | 1.25      |          | 1.15      | 1.2000   | 0.0500             |
| STRONTIUM                    | NA         | 0.07      |          | 0.06      | 0.0650   | 0.0050             |
| SODIUM                       | NA         | 4         |          | 4         | 4.0000   | 0.0000             |
| ARSENIC (µg/L)               | NA         | <1        |          | 1         | 0.5000   | 0.5000             |
| SELENIUM (µg/L)              | NA         | <1        |          | <1        | 0.0000   | 0.0000             |
| MERCURY (µg/L)               | NA         | 0.15      |          | <0.05     | 0.0500   | 0.0707             |
| CATION EQUIVALENCE           | 0.001      | 1.34      |          | 1.65      |          |                    |
| ANION EQUIVALENCE            | 0.56       | 0.97      |          | 1.09      |          |                    |
| CHARGE BALANCE ERROR         | -99.82     | 16.27     |          | 20.29     |          |                    |
| BTX (µg/L)                   |            |           |          |           |          |                    |
| BENZENE                      | NA         | <2        |          | <2        | 0.0000   | 0.0000             |
| TOLUENE                      | NA         | <1        |          | <1        | 0.0000   | 0.0000             |
| XYLENE                       | NA         | <2        |          | <2        | 0.0000   | 0.0000             |
| TOTAL BTX                    |            | 0         |          | 0         | 0.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | A7-1 | A7-1 | A7-1 | A7-1 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| FLUORENE                | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| ANTHRACENE              | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA   | <0.1 |      | <0.1 | 0.0000  | 0.0000                |
| PYRENE                  | NA   | <0.1 |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA   | <0.1 |      | <0.2 | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | <0.1 |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 |      | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | <0.1 |      | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA   | <0.1 |      | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 |      | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 |      | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 |      | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | 0    |      | 0    | 0.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | A7-2       |           |           |            | Average  | Standard<br>Deviation |
|------------------------------|------------|-----------|-----------|------------|----------|-----------------------|
|                              | A7-2       | A7-2      | A7-2      | A7-2       |          |                       |
| SAMPLE DATE                  | 88/08/30   | 88/11/20  | 89/03/08  | 89/05/31   |          |                       |
| BAS REF NO.                  | 8809032-02 | 8811092-4 | 880371-3  | 8906045-11 |          |                       |
| SAMPLING LEVEL               | 1          | 1         | 2+        | 2+         |          |                       |
| pH                           | 8.98       | 8.86      | 8.64      | 8.81       | 8.8225   | 0.1221                |
| SPECIFIC CONDUCTANCE (µS/cm) | 610        | 200       | 270       | 250        | 332.5000 | 162.2305              |
| TEMPERATURE (C)              | 10.5       | 8         | 6         | 11         | 8.8750   | 2.0117                |
| DISSOLVED OXYGEN             | 3.8        | NA        | 3.5       | 5.7        | 4.3333   | 0.9741                |
| DIC                          | NA         | NA        | NA        | NA         | -        | -                     |
| ALKALINITY                   | NA         | 101       | 98        | 94         | 97.6667  | 2.8674                |
| SULPHIDE                     | NA         | NA        | NA        | NA         | -        | -                     |
| TOTAL CYANIDE                | NA         | NA        | <0.005    | <0.002     | 0.0000   | 0.0000                |
| BROMIDE                      | <0.1       | <0.05     | <0.05     | <0.05      | 0.0000   | 0.0000                |
| CHLORIDE                     | 1.68       | 1.65/1.57 | 1.69      | 1.49       | 1.6175   | 0.0798                |
| FLUORIDE                     | 0.33       | 0.34/0.34 | 0.31      | 0.33       | 0.3275   | 0.0109                |
| SULPHATE                     | 10.4       | 10.0/9.7  | 6.1       | 6.1        | 8.1125   | 2.0219                |
| NITRATE-N                    | <0.01      | 0.12/0.12 | 0.01      | 0.05       | 0.0450   | 0.0472                |
| AMMONIA-N                    | NA         | NA        | NA        | NA         | -        | -                     |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 0.15/0.17 | NA         | 0.1600   | 0.0000                |
| TOTAL PHOSPHOROUS            | NA         | NA        | 0.048     | NA         | 0.0000   | 0.0000                |
| DOC                          | 1.0        | 1         | NA        | 1.1        | 1.0333   | 0.0471                |
| PHENOLS                      | <0.001     | <0.001    | 0.006     | <0.001     | 0.0015   | 0.0026                |
| PCB (µg/L)                   | NA         | NA        | NA        | NA         | -        | -                     |
| OIL AND GREASE               | <1         | NA        | NA        | NA         | 0.0000   | 0.0000                |
| ZINC                         | <0.01      | NA        | <0.01     | 0.01       | 0.0033   | 0.0047                |
| CADMIUM                      | 0.0004     | NA        | <0.005    | <0.005     | 0.0001   | 0.0002                |
| MANGANESE                    | 0.01       | NA        | 0.01      | 0.02       | 0.0133   | 0.0047                |
| COBALT                       | <0.01      | NA        | <0.01     | <0.01      | 0.0000   | 0.0000                |
| COPPER                       | 0.005      | NA        | <0.005    | 0.025      | 0.0100   | 0.0108                |
| IRON                         | 0.06       | NA        | 0.06      | 0.52       | 0.2133   | 0.2168                |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05      | 0.0000   | 0.0000                |
| CHROMIUM                     | <0.01      | NA        | <0.01     | <0.01      | 0.0000   | 0.0000                |
| NICKEL                       | <0.01      | NA        | <0.01     | <0.01      | 0.0000   | 0.0000                |
| BERYLLIUM                    | NA         | NA        | <0.01     | <0.01      | 0.0000   | 0.0000                |
| MOLYBDENUM                   | NA         | NA        | <0.02     | 0.01       | 0.0050   | 0.0050                |
| CALCIUM                      | NA         | 17.4      | 16.3      | 14.5       | 16.0667  | 1.1954                |
| VANADIUM                     | NA         | NA        | <0.01     | <0.01      | 0.0000   | 0.0000                |
| ALUMINUM                     | NA         | NA        | 0.08      | 0.86       | 0.4700   | 0.3900                |
| MAGNESIUM                    | NA         | 1.9       | 1.70      | 1.85       | 1.8167   | 0.0850                |
| BARIUM                       | NA         | NA        | 0.02      | 0.01       | 0.0150   | 0.0050                |
| POTASSIUM                    | NA         | 1.55      | 1.25      | 2          | 1.6000   | 0.3082                |
| STRONTIUM                    | NA         | NA        | 0.12      | 0.09       | 0.1050   | 0.0150                |
| SODIUM                       | NA         | 24        | 23        | 25         | 24.0000  | 0.8165                |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA         | -        | -                     |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA         | -        | -                     |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA         | -        | -                     |
| CATION EQUIVALENCE           | 0.00       | 2.11      | 2.00      | 2.13       |          |                       |
| ANION EQUIVALENCE            | 0.26       | 1.26      | 1.15      | 1.11       |          |                       |
| CHARGE BALANCE ERROR         | -98.38     | 25.12     | 26.75     | 31.49      |          |                       |
| BTX (µg/L)                   |            |           |           |            |          |                       |
| BENZENE                      | NA         | NA        | <10       | NA         | 0.0000   | 0.0000                |
| TOLUENE                      | NA         | NA        | 28        | NA         | 28.0000  | 0.0000                |
| XYLENE                       | NA         | NA        | 98        | NA         | 98.0000  | 0.0000                |
| TOTAL BTX                    | -          | -         | 126       | -          | 126.0000 | 0.0000                |

## Appendix 6: Groundwater

| PIEZOMETER              | A7-2 | A7-2 | A7-2 | A7-2 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| FLUORENE                | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| ANTHRACENE              | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA   | NA   | <0.1 | <0.1 | 0.0000  | 0.0000                |
| PYRENE                  | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | NA   | <0.2 | <0.2 | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | NA   | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | NA   | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA   | NA   | <0.1 | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | NA   | <0.1 | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | NA   | <0.5 | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | NA   | <0.5 | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | -    | 0    | 0    | 0.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed



## Appendix 6: Groundwater

| PIEZOMETER                   | B1         | B1        | B1        | B1        | Average   | Standard<br>Deviation |
|------------------------------|------------|-----------|-----------|-----------|-----------|-----------------------|
| SAMPLE DATE                  | 88/08/29   | 88/11/20  | 89/03/09  | 89/06/01  |           |                       |
| BAS REF NO.                  | 8809032-10 | 8811120-8 | 8903072-1 | 8906018-1 |           |                       |
| SAMPLING LEVEL               | 3          | 2         | 1         | 1         |           |                       |
| pH                           | 7.86       | 6.86      | 7.87      | 8.13      | 7.6800    | 0.4856                |
| SPECIFIC CONDUCTANCE (µS/cm) | 380        | 340       | 410       | 580       | 427.5000  | 91.4809               |
| TEMPERATURE (°C)             | 23         | 14        | 16        | 17        | 17.5000   | 3.3541                |
| DISSOLVED OXYGEN             | 2.5        | NA        | NA        | NA        | 2.5000    | 0.0000                |
| DIC                          | 33         | NA        | NA        | NA        | 33.0000   | 0.0000                |
| ALKALINITY                   | 126        | 95        | 119       | 152       | 123.0000  | 20.3101               |
| SULPHIDE                     | <0.05      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| TOTAL CYANIDE                | <0.002     | 0.002     | NA        | NA        | 0.0010    | 0.0010                |
| BROMIDE                      | <10        | NA        | <1        | 0.05      | 0.0167    | 0.0236                |
| CHLORIDE                     | 11         | NA        | 16.8      | 14        | 13.9333   | 2.3683                |
| FLUORIDE                     | <1         | NA        | 0.06      | 0.27      | 0.1100    | 0.1158                |
| SULPHATE                     | 80         | NA        | 6.0       | 2.7/2.7   | 29.5667   | 35.6872               |
| NITRATE-N                    | 2.0        | NA        | 1.7       | <0.01     | 1.2333    | 0.8807                |
| AMMONIA-N                    | 1.32/1.37  | NA        | NA        | NA        | 1.3450    | 0.0000                |
| TOTAL KJELDAHL NITROGEN      | 1.8        | NA        | NA        | NA        | 1.8000    | 0.0000                |
| TOTAL PHOSPHOROUS            | 0.05       | NA        | NA        | NA        | 0.0500    | 0.0000                |
| DOC                          | 12         | NA        | 14        | 15.7      | 13.9000   | 1.5122                |
| PHENOLS                      | 0.10       | 0.05      | 0.067     | 0.05      | 0.0668    | 0.0204                |
| PCB (µg/L)                   | <0.1       | NA        | NA        | NA        | 0.0000    | 0.0000                |
| OIL AND GREASE               | NA         | NA        | NA        | NA        | -         | -                     |
| ZINC                         | <0.01      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| CADMIUM                      | 0.0006     | NA        | NA        | NA        | 0.0006    | 0.0000                |
| MANGANESE                    | 0.19/0.18  | NA        | NA        | NA        | 0.1850    | 0.0000                |
| COBALT                       | <0.01      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| COPPER                       | <0.005     | NA        | NA        | NA        | 0.0000    | 0.0000                |
| IRON                         | 0.78/0.76  | NA        | NA        | NA        | 0.7700    | 0.0000                |
| LEAD                         | <0.05      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| CHROMIUM                     | <0.01      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| NICKEL                       | <0.01      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| BERYLLIUM                    | <0.01      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| MOLYBDENUM                   | <0.02      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| CALCIUM                      | 33         | 32        | 39        | 47        | 37.7500   | 5.9739                |
| VANADIUM                     | <0.01      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| ALUMINUM                     | 0.14       | NA        | NA        | NA        | 0.1400    | 0.0000                |
| MAGNESIUM                    | 2.3        | 1.35      | 1.7       | 1.9       | 1.8125    | 0.3435                |
| BARIUM                       | 0.05       | NA        | NA        | NA        | 0.0500    | 0.0000                |
| POTASSIUM                    | 4.3        | 4.2       | 4.4       | 8.8       | 5.4250    | 1.9498                |
| STRONTIUM                    | 0.08       | NA        | NA        | NA        | 0.0800    | 0.0000                |
| SODIUM                       | 12.5       | 11.5      | 19.5      | 16        | 14.8750   | 3.1499                |
| ARSENIC (µg/L)               | 7/7        | NA        | NA        | NA        | 7.0000    | 0.0000                |
| SELENIUM (µg/L)              | <1/<2      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| MERCURY (µg/L)               | <0.05      | NA        | NA        | NA        | 0.0000    | 0.0000                |
| CATION EQUIVALENCE           | 2.53       | 2.32      | 3.05      | 3.42      |           |                       |
| ANION EQUIVALENCE            | 3.27       | 0.95      | 1.82      | 1.97      |           |                       |
| CHARGE BALANCE ERROR         | -12.66     | 41.85     | 25.33     | 26.94     |           |                       |
| BTX (µg/L)                   |            |           |           |           |           |                       |
| BENZENE                      | NA         | 3450      | NA        | NA        | 3450.0000 | 0.0000                |
| TOLUENE                      | NA         | 519       | NA        | NA        | 519.0000  | 0.0000                |
| XYLENE                       | NA         | 349       | NA        | NA        | 349.0000  | 0.0000                |
| TOTAL BTX                    | -          | 4318      | -         | -         | 4318.0000 | 0.0000                |

## Appendix 6: Groundwater

| PIEZOMETER              | B1   | B1     | B1 | B1 | Average   | Standard<br>Deviation |
|-------------------------|------|--------|----|----|-----------|-----------------------|
| PAHs (µg/L)             |      |        |    |    |           |                       |
| NAPHTHALENE             | 68   | 880    | NA | NA | 474.0000  | 406.0000              |
| ACENAPHTHYLENE          | 170  | 182    | NA | NA | 176.0000  | 6.0000                |
| ACENAPHTHENE            | 130  | 2100   | NA | NA | 1115.0000 | 985.0000              |
| FLUORENE                | 130  | 1700   | NA | NA | 915.0000  | 785.0000              |
| PHENANTHRENE            | 150  | 5      | NA | NA | 77.5000   | 72.5000               |
| ANTHRACENE              | 99   | 540    | NA | NA | 319.5000  | 220.5000              |
| FLUORANTHENE            | 110  | 2.8    | NA | NA | 56.4000   | 53.6000               |
| PYRENE                  | 82   | 1120   | NA | NA | 601.0000  | 519.0000              |
| BENZO(a)ANTHRACENE      | 74   | 660    | NA | NA | 367.0000  | 293.0000              |
| CHRYSENE                | 120  | 450    | NA | NA | 285.0000  | 165.0000              |
| BENZO(b)FLUORANTHENE    | 83   | 410    | NA | NA | 246.5000  | 163.5000              |
| BENZO(k)FLUORANTHENE    | 110  | 158    | NA | NA | 134.0000  | 24.0000               |
| BENZO(a)PYRENE          | 52   | 400    | NA | NA | 226.0000  | 174.0000              |
| PERYLENE                | 75   | 78     | NA | NA | 76.5000   | 1.5000                |
| INDENO(1,2,3-C,D)PYRENE | 140  | 106    | NA | NA | 123.0000  | 17.0000               |
| DIBENZO(a,h)ANTHRACENE  | 36   | 26     | NA | NA | 31.0000   | 5.0000                |
| BENZO(g,h,i)PERYLENE    | 75   | 69     | NA | NA | 72.0000   | 3.0000                |
| TOTAL PAHs              | 1704 | 8886.8 | -  | -  | 5295.4000 | 3591.4000             |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | B2-1       | B2-1      | B2-1    | B2-1       | GWREP2    | Average  | Standard Deviation |
|------------------------------|------------|-----------|---------|------------|-----------|----------|--------------------|
|                              | (B2-1)     | (B2-1)    | (B2-1)  | (B2-1)     | (B2-1)    |          |                    |
| SAMPLE DATE                  | 88/08/31   | 88/11/19  | TUBING  | 89/05/30   | 89/05/30  |          |                    |
| BAS REF NO.                  | 8809031-04 | 8811095-8 | DROPPED | 8906008-13 | 8906036-2 |          |                    |
| SAMPLING LEVEL               | 2          | 2+        |         | 2+         |           |          |                    |
| pH                           | 11.65      | 9.88      | 10.76   | 9.19       | NA        | 10.3700  | 0.5863             |
| SPECIFIC CONDUCTANCE (µS/cm) | 670        | 190       | 310     | 230        | NA        | 350.0000 | 63.2456            |
| TEMPERATURE (°C)             | 11         | 8         | 6       | 10         | NA        | 8.7500   | 1.4510             |
| DISSOLVED OXYGEN             | 5.5        | NA        | NA      | 5.4        | NA        | 5.4500   | 0.0250             |
| DIC                          | 8          | NA        |         | NA         | NA        | 8.0000   | 0.0000             |
| ALKALINITY                   | 138        | 50        |         | 54         | NA        | 80.6667  | 40.5737            |
| SULPHIDE                     | <0.05      | NA        |         | NA         | NA        | 0.0000   | 0.0000             |
| TOTAL CYANIDE                | NA         | <0.002    |         | <0.002     | NA        | 0.0000   | 0.0000             |
| BROMIDE                      | <2         | <0.05     |         | <0.05      | NA        | 0.0000   | 0.0000             |
| CHLORIDE                     | 16.5       | 14.8      |         | 11.1       | NA        | 14.1333  | 2.2544             |
| FLUORIDE                     | 0.50       | 0.06      |         | 0.04       | NA        | 0.2000   | 0.2123             |
| SULPHATE                     | 17.5       | 13        |         | 11.5       | NA        | 14.0000  | 2.5495             |
| NITRATE-N                    | 0.75       | 0.74      |         | 0.71       | NA        | 0.7333   | 0.0170             |
| AMMONIA-N                    | NA         | NA        |         | NA         | NA        | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | 0.25       | 0.12/0.13 |         | NA         | NA        | 0.1875   | 0.0625             |
| TOTAL PHOSPHOROUS            | NA         | 1.29/1.35 |         | NA         | NA        | 1.3200   | 0.0000             |
| DOC                          | 0.5        |           |         | <0.5       | NA        | 0.2500   | 0.2500             |
| PHENOLS                      | <0.001     | 0.002     |         | 0.002      | NA        | 0.0013   | 0.0009             |
| PCB (µg/L)                   | NA         | NA        |         | NA         | NA        | -        | -                  |
| OIL AND GREASE               | NA         | NA        |         | NA         | NA        | -        | -                  |
| ZINC                         | <0.01      | NA        |         | <0.01      | NA        | 0.0000   | 0.0000             |
| CADMIUM                      | 0.0010     | NA        |         | <0.005     | NA        | 0.0003   | 0.0005             |
| MANGANESE                    | <0.01      | NA        |         | <0.01      | NA        | 0.0000   | 0.0000             |
| COBALT                       | <0.01      | NA        |         | <0.01      | NA        | 0.0000   | 0.0000             |
| COPPER                       | <0.005     | NA        |         | 0.01       | NA        | 0.0050   | 0.0050             |
| IRON                         | <0.02      | NA        |         | 0.1        | NA        | 0.0500   | 0.0500             |
| LEAD                         | <0.05      | NA        |         | <0.05      | NA        | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | NA        |         | <0.01      | NA        | 0.0000   | 0.0000             |
| NICKEL                       | <0.01      | NA        |         | <0.01      | NA        | 0.0000   | 0.0000             |
| BERYLLIUM                    | <0.01      | NA        |         | <0.01      | NA        | 0.0000   | 0.0000             |
| MOLYBDENUM                   | <0.02      | NA        |         | <0.02      | NA        | 0.0000   | 0.0000             |
| CALCIUM                      | 11.3       | 24        |         | 24         | NA        | 19.7667  | 5.9868             |
| VANADIUM                     | 0.01       | NA        |         | <0.01      | NA        | 0.0050   | 0.0050             |
| ALUMINUM                     | 0.06       | NA        |         | 0.2        | NA        | 0.1300   | 0.0070             |
| MAGNESIUM                    | 0.45       | 3.8       |         | 3.7        | NA        | 2.6500   | 1.5562             |
| BARIUM                       | 0.04       | NA        |         | 0.03       | NA        | 0.0350   | 0.0050             |
| POTASSIUM                    | 53         | 4.2       |         | 4.3        | NA        | 20.5000  | 22.9810            |
| STRONTIUM                    | 0.13       | NA        |         | 0.11       | NA        | 0.1200   | 0.0100             |
| SODIUM                       | 36         | 8.3       |         | 8.5        | NA        | 17.6000  | 13.0110            |
| ARSENIC (µg/L)               | NA         | NA        |         | NA         | NA        | -        | -                  |
| SELENIUM (µg/L)              | NA         | NA        |         | NA         | NA        | -        | -                  |
| MERCURY (µg/L)               | NA         | NA        |         | NA         | NA        | -        | -                  |
| CATION EQUIVALENCE           | 3.53       | 1.98      |         | 2.01       | 0.00      |          |                    |
| ANION EQUIVALENCE            | 2.22       | 1.20      |         | 1.10       | 0.00      |          |                    |
| CHARGE BALANCE ERROR         | 22.75      | 24.51     |         | 29.06      | -         |          |                    |
| BTX (µg/L)                   |            |           |         |            |           |          |                    |
| BENZENE                      | NA         | <2        |         | <2         | <2        | 0.0000   | 0.0000             |
| TOLUENE                      | NA         | <1        |         | <1         | <1        | 0.0000   | 0.0000             |
| XYLENE                       | NA         | <2        |         | 2          | <2        | 0.6667   | 0.8165             |
| TOTAL BTX                    | -          | 0         |         | 2          | 0         | 0.6667   | 0.8165             |

## Appendix 6: Groundwater

| PIEZOMETER              | B2-1  | B2-1 | B2-1 | B2-1 | GWREP2 | Average | Standard Deviation |
|-------------------------|-------|------|------|------|--------|---------|--------------------|
| PAHs (µg/L)             |       |      |      |      |        |         |                    |
| NAPHTHALENE             | 0.21  | <0.1 |      | <0.5 | <0.1   | 0.0525  | 0.0227             |
| ACENAPHTHYLENE          | <0.01 | <0.1 |      | <0.5 | <0.1   | 0.0000  | 0.0000             |
| ACENAPHTHENE            | 0.01  | <0.1 |      | <0.5 | <0.1   | 0.0025  | 0.0011             |
| FLUORENE                | 0.03  | <0.1 |      | <0.5 | 0.1    | 0.0075  | 0.0032             |
| PHENANTHRENE            | 0.04  | <0.1 |      | <0.5 | <0.1   | 0.0100  | 0.0043             |
| ANTHRACENE              | <0.01 | <0.1 |      | <0.5 | <0.1   | 0.0000  | 0.0000             |
| FLUORANTHENE            | 3.1   | <0.1 |      | <0.5 | <0.1   | 0.7750  | 0.3356             |
| PYRENE                  | 0.77  | <0.1 |      | <0.2 | <0.2   | 0.1925  | 0.0834             |
| BENZO(a)ANTHRACENE      | 1.06  | <0.1 |      | <0.2 | <0.2   | 0.2650  | 0.1147             |
| CHRYSENE                | 3.1   | <0.1 |      | <0.2 | <0.2   | 0.7750  | 0.3356             |
| BENZO(b)FLUORANTHENE    | 5.3   | <0.2 |      | <0.2 | <0.2   | 1.3250  | 0.5737             |
| BENZO(k)FLUORANTHENE    | 0.49  | <0.1 |      | <0.2 | <0.2   | 0.1225  | 0.0530             |
| BENZO(a)PYRENE          | 1.8   | <0.1 |      | <0.5 | <0.5   | 0.4500  | 0.1949             |
| PERYLENE                | 0.63  | <0.1 |      | <0.5 | <0.5   | 0.1575  | 0.0682             |
| INDENO(1,2,3-C,D)PYRENE | 1.8   | <0.1 |      | <0.5 | <0.5   | 0.4500  | 0.1949             |
| DIBENZO(a,h)ANTHRACENE  | 0.97  | <0.5 |      | <0.5 | <0.5   | 0.2425  | 0.1050             |
| BENZO(g,h,i)PERYLENE    | 1.11  | <0.5 |      | <0.5 | <0.5   | 0.2775  | 0.1202             |
| TOTAL PAHs              | 20.42 | 0    |      | 0    | 0.1    | 5.1300  | 8.8278             |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | B2-2       |           |           |           | Average   | Standard Deviation |
|------------------------------|------------|-----------|-----------|-----------|-----------|--------------------|
|                              | B2-2       | B2-2      | B2-2      | B2-2      |           |                    |
| SAMPLE DATE                  | 88/08/29   | 88/11/19  | 89/03/09  | 89/05/30  |           |                    |
| BAS REF NO.                  | 8809032-08 | 8811095-9 | 8903072-3 | 8906008-5 |           |                    |
| SAMPLING LEVEL               | 2          | 2+        | 2+        | 2         |           |                    |
| pH                           | 7.42       | 7.53      | 7.69      | 7.57      | 7.5525    | 0.0965             |
| SPECIFIC CONDUCTANCE (µS/cm) | 1110       | 1070      | 1200      | 1140      | 1130.0000 | 47.4342            |
| TEMPERATURE (°C)             | 11.5       | 8         | 7         | 15        | 10.3750   | 3.1499             |
| DISSOLVED OXYGEN (ppm)       | 5.2        | NA        | 4.5       | 4.8       | 4.8333    | 0.2867             |
| DIC                          | 41         | NA        | NA        | NA        | 41.0000   | 0.0000             |
| ALKALINITY                   | 150        | 200       | 179       | 191       | 180.0000  | 18.8547            |
| SULPHIDE                     | <0.05      | NA        | NA        | NA        | 0.0000    | 0.0000             |
| TOTAL CYANIDE                | NA         | 0.005     | 0.022     | 0.006     | 0.0110    | 0.0078             |
| BROMIDE                      | 1.0        | 1.04      | 1.40      | 1.3       | 1.1850    | 0.1693             |
| CHLORIDE                     | 210        | 156       | 177       | 168       | 177.7500  | 20.0546            |
| FLUORIDE                     | 1.5        | 2         | 1.64      | 1.36      | 1.6250    | 0.2381             |
| SULPHATE                     | 71         | 24        | 16.6      | 17.2      | 32.2000   | 22.5889            |
| NITRATE-N                    | <0.1       | <0.05     | <0.05     | <0.2      | 0.0000    | 0.0000             |
| AMMONIA-N                    | NA         | NA        | NA        | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | 2.6        | 2.4       | NA        | NA        | 2.5000    | 0.1000             |
| TOTAL PHOSPHOROUS            | NA         | 0.23      | NA        | NA        | 0.2300    | 0.0000             |
| DOC                          | 4.0        | NA        | NA        | 4         | 4.0000    | 0.0000             |
| PHENOLS                      | 0.001      | 0.001     | 0.016     | <0.001    | 0.0045    | 0.0067             |
| PCB (µg/L)                   | NA         | NA        | NA        | NA        | -         | -                  |
| OIL AND GREASE               | NA         | NA        | NA        | NA        | -         | -                  |
| ZINC                         | 0.02       | NA        | 0.10      | 0.01      | 0.0433    | 0.0403             |
| CADMIUM                      | 0.0004     | NA        | <0.005    | <0.005    | 0.0001    | 0.0002             |
| MANGANESE                    | 0.23       | NA        | 0.21      | 0.23      | 0.2233    | 0.0094             |
| COBALT                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| COPPER                       | <0.005     | NA        | <0.005    | 0.01      | 0.0033    | 0.0047             |
| IRON                         | 0.40       | NA        | 0.56      | 1.52      | 0.8267    | 0.4946             |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| NICKEL                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| BERYLLIUM                    | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | <0.02      | NA        | <0.02     | <0.02     | 0.0000    | 0.0000             |
| CALCIUM                      | 75         | 72        | 68        | 72        | 71.7500   | 2.4875             |
| VANADIUM                     | <0.01      | NA        | <0.01     | <0.01     | 0.0000    | 0.0000             |
| ALUMINUM                     | 0.46       | NA        | 0.22      | 0.26      | 0.3133    | 0.1050             |
| MAGNESIUM                    | 21         | 14.7      | 18.5      | 19.6      | 18.4500   | 2.3393             |
| BARIUM                       | 0.25       | NA        | 0.25      | 0.24      | 0.2467    | 0.0047             |
| POTASSIUM                    | 64         | 64        | 47        | 43        | 54.5000   | 9.6047             |
| STRONTIUM                    | 0.41       | NA        | 0.34      | 0.34      | 0.3633    | 0.0330             |
| SODIUM                       | 77         | 55        | 59        | 57        | 62.0000   | 8.7750             |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA        | -         | -                  |
| CATION EQUIVALENCE           | 10.52      | 8.83      | 8.73      | 8.87      |           |                    |
| ANION EQUIVALENCE            | 8.90       | 6.90      | 7.13      | 7.01      |           |                    |
| CHARGE BALANCE ERROR         | 8.35       | 12.29     | 10.10     | 11.73     |           |                    |
| BTX (µg/L)                   |            |           |           |           |           |                    |
| BENZENE                      | NA         | <2        | NA        | NA        | 0.0000    | 0.0000             |
| TOLUENE                      | NA         | <1        | NA        | NA        | 0.0000    | 0.0000             |
| XYLENE                       | NA         | <2        | NA        | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | 0         | -         | -         | 0.0000    | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | B2-2  | B2-2 | B2-2 | B2-2 | Average | Standard<br>Deviation |
|-------------------------|-------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |       |      |      |      |         |                       |
| NAPHTHALENE             | 0.13  | <0.1 | <0.1 | NA   | 0.0433  | 0.0613                |
| ACENAPHTHYLENE          | 0.08  | 0.1  | <0.1 | NA   | 0.0600  | 0.0432                |
| ACENAPHTHENE            | 0.41  | 1.2  | 0.6  | NA   | 0.7367  | 0.3367                |
| FLUORENE                | 0.13  | 0.2  | 0.1  | NA   | 0.1433  | 0.0419                |
| PHENANTHRENE            | 0.06  | <0.1 | <0.1 | NA   | 0.0200  | 0.0283                |
| ANTHRACENE              | <0.01 | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| FLUORANTHENE            | 0.04  | <0.1 | <0.1 | NA   | 0.0133  | 0.0189                |
| PYRENE                  | 0.04  | <0.1 | <0.1 | NA   | 0.0133  | 0.0189                |
| BENZO(a)ANTHRACENE      | 0.02  | <0.1 | <0.1 | NA   | 0.0067  | 0.0094                |
| CHRYSENE                | 0.03  | <0.1 | <0.1 | NA   | 0.0100  | 0.0141                |
| BENZO(b)FLUORANTHENE    | <0.05 | <0.2 | <0.2 | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.05 | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.1  | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| PERYLENE                | <0.1  | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1  | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.2  | <0.5 | <0.5 | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.1  | <0.5 | <0.5 | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | 0.94  | 1.5  | 0.7  | -    | 1.0467  | 0.3352                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | B2-3      | B2-3       | B2-3      | B2-3       | Average  | Standard Deviation |
|------------------------------|-----------|------------|-----------|------------|----------|--------------------|
| SAMPLE DATE                  | NOT       | 88/11/21   | 89/03/09  | 89/05/30   |          |                    |
| BAS REF NO.                  | INSTALLED | 8811120-12 | 8903072-4 | 8906008-12 |          |                    |
| SAMPLING LEVEL               |           | 2+         | 2+        | 2          |          |                    |
| pH                           |           | 8.57       | 8.48      | 7.29       | 8.1133   | 0.5833             |
| SPECIFIC CONDUCTANCE (µS/cm) |           | 230        | 300       | 280        | 270.0000 | 29.4392            |
| TEMPERATURE (°C)             |           | 7          | 8         | 10         | 8.3333   | 1.2472             |
| DISSOLVED OXYGEN (ppm)       |           | NA         | 2.45      | 5.3        | 3.8750   | 1.4250             |
| DIC                          |           | NA         | NA        | NA         | -        | -                  |
| ALKALINITY                   |           | 62         | 61        | 60         | 61.0000  | 0.8165             |
| SULPHIDE                     |           | NA         | NA        | NA         | -        | -                  |
| TOTAL CYANIDE                |           | <0.002     | <0.005    | <0.002     | 0.0000   | 0.0000             |
| BROMIDE                      |           | <0.05      | <0.1/<0.1 | <0.05      | 0.0000   | 0.0000             |
| CHLORIDE                     |           | 24         | 21/21     | 22         | 22.3333  | 1.2472             |
| FLUORIDE                     |           | 0.12/0.14  | 0.08/0.08 | 0.11       | 0.1067   | 0.0205             |
| SULPHATE                     |           | 18.5/19.4  | 13.2/13.4 | 13.5       | 15.2500  | 2.6176             |
| NITRATE-N                    |           | 0.60/0.64  | 0.66/0.66 | 0.54/0.52  | 0.6033   | 0.0544             |
| AMMONIA-N                    |           | NA         | NA        | NA         | -        | -                  |
| TOTAL KJELDAHL NITROGEN      |           | 0.09       | NA        | NA         | 0.0900   | 0.0000             |
| TOTAL PHOSPHOROUS            |           | 0.84       | NA        | NA         | 0.8400   | 0.0000             |
| DOC                          |           | NA         | NA        | <0.5       | 0.0000   | 0.0000             |
| PHENOLS                      |           | 0.001      | 0.014     | <0.001     | 0.0050   | 0.0064             |
| PCB (µg/L)                   |           | NA         | NA        | NA         | -        | -                  |
| OIL AND GREASE               |           | NA         | NA        | NA         | -        | -                  |
| ZINC                         |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| CADMIUM                      |           | NA         | <0.005    | <0.005     | 0.0000   | 0.0000             |
| MANGANESE                    |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| COBALT                       |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| COPPER                       |           | NA         | <0.005    | <0.005     | 0.0000   | 0.0000             |
| IRON                         |           | NA         | 0.04      | <0.02      | 0.0200   | 0.0200             |
| LEAD                         |           | NA         | <0.05     | <0.05      | 0.0000   | 0.0000             |
| CHROMIUM                     |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| NICKEL                       |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| BERYLLIUM                    |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| MOLYBDENUM                   |           | NA         | <0.02     | <0.02      | 0.0000   | 0.0000             |
| CALCIUM                      |           | 23         | 25        | 26         | 24.6667  | 1.2472             |
| VANADIUM                     |           | NA         | <0.01     | <0.01      | 0.0000   | 0.0000             |
| ALUMINUM                     |           | NA         | 0.08      | 0.04       | 0.0600   | 0.0200             |
| MAGNESIUM                    |           | 3.9        | 4.1       | 4.4        | 4.1333   | 0.2055             |
| BARIUM                       |           | NA         | 0.04      | 0.04       | 0.0400   | 0.0000             |
| POTASSIUM                    |           | 4.9        | 4.3       | 4.2        | 4.4667   | 0.3091             |
| STRONTIUM                    |           | NA         | 0.48      | 0.47       | 0.4750   | 0.0050             |
| SODIUM                       |           | 16.5       | 8.5       | 8.5        | 11.1667  | 3.7712             |
| ARSENIC (µg/L)               |           | NA         | NA        | NA         | -        | -                  |
| SELENIUM (µg/L)              |           | NA         | NA        | NA         | -        | -                  |
| MERCURY (µg/L)               |           | NA         | NA        | NA         | -        | -                  |
| CATION EQUIVALENCE           |           | 2.31       | 2.07      | 2.14       |          |                    |
| ANION EQUIVALENCE            |           | 1.70       | 1.49      | 1.51       |          |                    |
| CHARGE BALANCE ERROR         |           | 15.22      | 16.43     | 17.29      |          |                    |
| BTX (µg/L)                   |           |            |           |            |          |                    |
| BENZENE                      |           | <2         | NA        | NA         | 0.0000   | 0.0000             |
| TOLUENE                      |           | <1         | NA        | NA         | 0.0000   | 0.0000             |
| XYLENE                       |           | <2         | NA        | NA         | 0.0000   | 0.0000             |
| TOTAL BTX                    |           | 0          | -         | -          | 0.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | B2-3 | B2-3 | B2-3 | B2-3 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| ACENAPHTHENE            | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| FLUORENE                | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| PHENANTHRENE            | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| ANTHRACENE              | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| FLUORANTHENE            | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| PYRENE                  | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| CHRYSENE                | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | <0.2 | <0.2 | NA   |      | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| PERYLENE                | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1 | <0.1 | NA   |      | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.5 | <0.5 | NA   |      | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.5 | <0.5 | NA   |      | 0.0000  | 0.0000                |
| TOTAL PAHs              | 0    | 0    | -    |      | 0.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed



## Appendix 6: Groundwater

| PIEZOMETER                   | B3         | B3        | B3        | B3        | GWREP3    | Average   | Standard Deviation |
|------------------------------|------------|-----------|-----------|-----------|-----------|-----------|--------------------|
|                              |            |           |           |           | (B3)      |           |                    |
| SAMPLE DATE                  | 88/08/30   | 88/11/20  | 89/03/08  | 89/06/01  | 89/06/01  |           |                    |
| BAS REF NO.                  | 8809032-03 | 8811120-4 | 880371-4  | 8906018-2 | 8906018-7 |           |                    |
| SAMPLING LEVEL               | 1          | 2+        | 2+        | 2+        |           |           |                    |
| pH                           | 12.10      | 12.20     | 12.44     | 12.1      | NA        | 12.2100   | 0.1389             |
| SPECIFIC CONDUCTANCE (µS/cm) | 1610       | 1880      | 2470      | 2000      | NA        | 1990.0000 | 311.0466           |
| TEMPERATURE (°C)             | 13.5       | 10        | 6         | 9         | NA        | 9.6250    | 2.6780             |
| DISSOLVED OXYGEN (ppm)       | 1.8        | NA        | NA        | NA        | NA        | 1.8000    | 0.0000             |
| DIC                          | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| ALKALINITY                   | NA         | 220       | 260       | 250       | NA        | 243.3333  | 16.9967            |
| SULPHIDE                     | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| TOTAL CYANIDE                | NA         |           | 0.082     | 0.004     | NA        | 0.0430    | 0.0390             |
| BROMIDE                      | <1         | <0.5      | 0.24/0.24 | 0.2       | NA        | 0.1100    | 0.1109             |
| CHLORIDE                     | 37         | 48        | 64/62     | 130       | NA        | 69.5000   | 36.1282            |
| FLUORIDE                     | 0.30       | 0.5       | 0.40/0.40 | 0.44      | NA        | 0.4100    | 0.0728             |
| SULPHATE                     | 104        | 110       | 130/132   | 103       | NA        | 112.0000  | 11.2916            |
| NITRATE-N                    | <0.1       | <0.1      | <0.05     | <0.05     | NA        | 0.0000    | 0.0000             |
| AMMONIA-N                    | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 3.1       | NA        | NA        | 3.1000    | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        | 0.005     | NA        | NA        | 0.0050    | 0.0000             |
| DOC                          | 4.0        | 4         | NA        | 3.2       | NA        | 3.7333    | 0.3771             |
| PHENOLS                      | 0.015      | 0.006     | 0.009     | 0.006     | NA        | 0.0090    | 0.0037             |
| PCB (µg/L)                   | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| OIL AND GREASE               | 2          | NA        | NA        | NA        | NA        | 2.0000    | 0.0000             |
| ZINC                         | 0.01       | NA        | <0.01     | <0.01     | NA        | 0.0033    | 0.0047             |
| CADMIUM                      | 0.0008     | NA        | <0.005    | <0.005    | NA        | 0.0003    | 0.0004             |
| MANGANESE                    | <0.01      | NA        | <0.01     | <0.01     | NA        | 0.0000    | 0.0000             |
| COBALT                       | 0.02       | NA        | <0.01     | <0.01     | NA        | 0.0067    | 0.0094             |
| COPPER                       | <0.005     | NA        | <0.005    | <0.005    | NA        | 0.0000    | 0.0000             |
| IRON                         | 0.02       | NA        | 0.04      | <0.02     | NA        | 0.0200    | 0.0163             |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05     | NA        | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.02       | NA        | <0.01     | 0.01      | NA        | 0.0100    | 0.0082             |
| NICKEL                       | <0.01      | NA        | <0.01     | <0.01     | NA        | 0.0000    | 0.0000             |
| BERYLLIUM                    | NA         | NA        | <0.01     | <0.01     | NA        | 0.0000    | 0.0000             |
| MOLYBDENUM                   | NA         | NA        | 0.02      | <0.02     | NA        | 0.0100    | 0.0100             |
| CALCIUM                      | NA         | 119/119   | 138       | 129       | NA        | 128.6667  | 7.7603             |
| VANADIUM                     | NA         | NA        | 0.03      | 0.04      | NA        | 0.0350    | 0.0050             |
| ALUMINUM                     | NA         | NA        | 0.36      | 0.2       | NA        | 0.2800    | 0.0800             |
| MAGNESIUM                    | NA         | 0.15      | 0.10      | 0.25      | NA        | 0.1667    | 0.0624             |
| BARIUM                       | NA         | NA        | 0.08      | 0.6       | NA        | 0.3400    | 0.2600             |
| POTASSIUM                    | NA         | 39        | 54        | 43        | NA        | 45.3333   | 6.3421             |
| STRONTIUM                    | NA         | NA        | 0.76      | 0.68      | NA        | 0.7200    | 0.0400             |
| SODIUM                       | NA         | 27        | 34        | 69        | NA        | 43.3333   | 18.3727            |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA        | NA        | -         | -                  |
| CATION EQUIVALENCE           | 0.00       | 8.12      | 9.80      | 10.58     | 0.00      |           |                    |
| ANION EQUIVALENCE            | 3.21       | 5.84      | 7.10      | 8.31      | 0.00      |           |                    |
| CHARGE BALANCE ERROR         | -99.96     | 16.33     | 15.94     | 12.03     | -         |           |                    |
| BTX (µg/L)                   |            |           |           |           |           |           |                    |
| BENZENE                      | NA         | NA        | 19        | NA        | NA        | 19.0000   | 0.0000             |
| TOLUENE                      | NA         | NA        | 17        | NA        | NA        | 17.0000   | 0.0000             |
| XYLENE                       | NA         | NA        | <10       | NA        | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | -         | 36        | -         | -         | 36.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | B3 | B3 | B3   | B3   | GWREP3 | Average | Standard<br>Deviation |
|-------------------------|----|----|------|------|--------|---------|-----------------------|
| PAHs (µg/L)             |    |    |      |      |        |         |                       |
| NAPHTHALENE             | NA | NA | 0.1  | <0.1 | 0.2    | 0.1000  | 0.0816                |
| ACENAPHTHYLENE          | NA | NA | 0.3  | 0.4  | 0.3    | 0.3333  | 0.0471                |
| ACENAPHTHENE            | NA | NA | 2.3  | 2.3  | 2.2    | 2.2667  | 0.0471                |
| FLUORENE                | NA | NA | 1.9  | 2.4  | 2.1    | 2.1333  | 0.2055                |
| PHENANTHRENE            | NA | NA | 3.5  | 4.5  | 4.7    | 4.2333  | 0.5249                |
| ANTHRACENE              | NA | NA | 0.8  | 0.7  | 0.9    | 0.8000  | 0.0816                |
| FLUORANTHENE            | NA | NA | 2.6  | 3.2  | 3.4    | 3.0667  | 0.3399                |
| PYRENE                  | NA | NA | 1.9  | 2.3  | 2.5    | 2.2333  | 0.2494                |
| BENZO(a)ANTHRACENE      | NA | NA | 0.1  | 0.2  | 0.5    | 0.2667  | 0.1700                |
| CHRYSENE                | NA | NA | 0.1  | 0.2  | 0.5    | 0.2667  | 0.1700                |
| BENZO(b)FLUORANTHENE    | NA | NA | <0.2 | <0.2 | 0.7    | 0.2333  | 0.3300                |
| BENZO(k)FLUORANTHENE    | NA | NA | <0.1 | <0.2 | <0.2   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA | NA | <0.1 | <0.5 | <0.5   | 0.0000  | 0.0000                |
| PERYLENE                | NA | NA | <0.1 | <0.5 | <0.5   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | <0.1 | <0.5 | <0.5   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | <0.5 | <0.5 | <0.5   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA | NA | <0.5 | <0.5 | <0.5   | 0.0000  | 0.0000                |
| TOTAL PAHs              | -  | -  | 13.6 | 16.2 | 18     | 15.9333 | 1.8062                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | B4-1       | B4-1      | B4-1      | B4-1      | Average  | Standard Deviation |
|------------------------------|------------|-----------|-----------|-----------|----------|--------------------|
| SAMPLE DATE                  | 88/08/31   | 88/11/20  | 89/03/09  | 89/05/31  |          |                    |
| BAS REF NO.                  | 8809031-01 | 8811120-9 | 8903072-5 | 8906045-5 |          |                    |
| SAMPLING LEVEL               | 1          | 2+        | 2+        | 2         |          |                    |
| pH                           | 9.61       | 10.18     | 9.62      | 9.82      | 9.8075   | 0.2308             |
| SPECIFIC CONDUCTANCE (µS/cm) | 220        | 260       | 290       | 250       | 255.0000 | 25.0000            |
| TEMPERATURE (°C)             | 12         | 8         | 7         | 10        | 9.2500   | 1.9203             |
| DISSOLVED OXYGEN (ppm)       | 3.5        | NA        | 4.0       | 8         | 5.1667   | 2.0138             |
| DIC                          | NA         | NA        | NA        | NA        | -        | -                  |
| ALKALINITY                   | NA         | 34        | 51        | 43        | 42.6667  | 6.9442             |
| SULPHIDE                     | NA         | NA        | NA        | NA        | -        | -                  |
| TOTAL CYANIDE                | NA         | <0.002    | <0.005    | <0.002    | 0.0000   | 0.0000             |
| BROMIDE                      | <0.1       | <0.05     | <0.05     | <0.05     | 0.0000   | 0.0000             |
| CHLORIDE                     | 31         | 27        | 29        | 26        | 28.2500  | 1.9203             |
| FLUORIDE                     | 0.19       | 0.28/0.30 | 0.20      | 0.25      | 0.2325   | 0.0402             |
| SULPHATE                     | 20/20      | 16.5/16.8 | 15.0      | 21        | 18.1625  | 2.4350             |
| NITRATE-N                    | 0.06       | 0.04      | 0.02      | 0.05      | 0.0425   | 0.0148             |
| AMMONIA-N                    | NA         | NA        | NA        | NA        | -        | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | 0.17/0.16 | NA        | NA        | 0.1650   | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | 6.0/6.2   | NA        | NA        | 6.1000   | 0.0000             |
| DOC                          | 0.5        | NA        | NA        | 0.8       | 0.6500   | 0.1500             |
| PHENOLS                      | <0.001     | 0.001     | 0.015     | <0.001    | 0.0040   | 0.0064             |
| PCB (µg/L)                   | NA         | NA        | NA        | NA        | -        | -                  |
| OIL AND GREASE               | <1         | NA        | NA        | NA        | 0.0000   | 0.0000             |
| ZINC                         | <0.01      | NA        | 0.03      | <0.01     | 0.0100   | 0.0141             |
| CADMIUM                      | 0.0008     | NA        | <0.005    | <0.005    | 0.0003   | 0.0004             |
| MANGANESE                    | <0.01      | NA        | <0.01     | 0.11      | 0.0367   | 0.0519             |
| COBALT                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| COPPER                       | 0.005      | NA        | <0.005    | 0.03      | 0.0117   | 0.0131             |
| IRON                         | 0.06       | NA        | 0.04      | 2.3       | 0.8000   | 1.0607             |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05     | 0.0000   | 0.0000             |
| CHROMIUM                     | <0.01      | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| NICKEL                       | <0.01      | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| BERYLLIUM                    | NA         | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| MOLYBDENUM                   | NA         | NA        | <0.02     | <0.01     | 0.0000   | 0.0000             |
| CALCIUM                      | NA         | 32/32     | 34/35     | 26        | 30.8333  | 3.5668             |
| VANADIUM                     | NA         | NA        | <0.01     | <0.01     | 0.0000   | 0.0000             |
| ALUMINUM                     | NA         | NA        | 0.08/0.04 | 2.9       | 1.4800   | 1.4200             |
| MAGNESIUM                    | NA         | 1.50/1.50 | 2.7/2.7   | 3.8       | 2.6667   | 0.9393             |
| BARIUM                       | NA         | NA        | 0.04/0.04 | 0.06      | 0.0500   | 0.0100             |
| POTASSIUM                    | NA         | 3.3/3.3   | 2.6/2.5   | 3.9       | 3.2500   | 0.5523             |
| STRONTIUM                    | NA         | NA        | 0.16/0.17 | 0.15      | 0.1575   | 0.0075             |
| SODIUM                       | NA         | 9.0/9.0   | 6.0/6.0   | 9.5       | 8.1667   | 1.5456             |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA        | -        | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA        | -        | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA        | -        | -                  |
| CATION EQUIVALENCE           | 0.00       | 2.20      | 2.28      | 2.53      |          |                    |
| ANION EQUIVALENCE            | 1.29       | 1.45      | 1.64      | 1.60      |          |                    |
| CHARGE BALANCE ERROR         | -99.67     | 20.61     | 16.28     | 22.45     |          |                    |
| BTX (µg/L)                   |            |           |           |           |          |                    |
| BENZENE                      | NA         | <2        | NA        | NA        | 0.0000   | 0.0000             |
| TOLUENE                      | NA         | <1        | NA        | NA        | 0.0000   | 0.0000             |
| XYLENE                       | NA         | <2        | NA        | NA        | 0.0000   | 0.0000             |
| TOTAL BTX                    | -          | 0         | -         | -         | 0.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | B4-1 | B4-1 | B4-1 | B4-1 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |      |         |                       |
| NAPHTHALENE             | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| FLUORENE                | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA   | 0.1  | <0.1 | NA   | 0.0500  | 0.0500                |
| ANTHRACENE              | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA   | 0.2  | 0.2  | NA   | 0.2000  | 0.0000                |
| PYRENE                  | NA   | 0.2  | 0.2  | NA   | 0.2000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 | <0.1 | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| PERYLENE                | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 | <0.5 | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 | <0.5 | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | 0.5  | 0.4  | -    | 0.4500  | 0.0500                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | B4-2       | B4-2       | B4-2      | GWREP2    | B4-2      | Average   | Standard Deviation |
|------------------------------|------------|------------|-----------|-----------|-----------|-----------|--------------------|
|                              |            |            |           | (B4-2)    |           |           |                    |
| SAMPLE DATE                  | 88/08/29   | 88/11/20   | 89/03/09  | 89/03/09  | 89/05/31  |           |                    |
| BAS REF NO.                  | 8809032-05 | 8811120-10 | 8903072-6 | 8903072-7 | 8906045-6 |           |                    |
| SAMPLING LEVEL               | 1          | 2+         | 2+        |           | 2         |           |                    |
| pH                           | 12.37      | 12.5       | 12.64     | NA        | 12.32     | 12.4575   | 0.1242             |
| SPECIFIC CONDUCTANCE (µS/cm) | 4180       | 3130       | 3650      | NA        | 3400      | 3590.0000 | 387.1046           |
| TEMPERATURE (°C)             | 13         | 9          | 6         | NA        | 9         | 9.2500    | 2.4875             |
| DISSOLVED OXYGEN (ppm)       | 5.9        | NA         | 0         | 0.9       | 0         | 1.7000    | 2.4525             |
| DIC                          | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| ALKALINITY                   | NA         | 510        | 450       | 470       | 430       | 465.0000  | 29.5804            |
| SULPHIDE                     | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| TOTAL CYANIDE                | NA         | <0.002     | 0.045     | 0.046     | <0.002    | 0.0228    | 0.0228             |
| BROMIDE                      | <5         | <1         | <1        | <1        | <1        | 0.0000    | 0.0000             |
| CHLORIDE                     | 290        | 118        | 104       | 100       | 150       | 152.4000  | 71.0087            |
| FLUORIDE                     | <0.5       | 1          | 0.80      | 0.80      | <0.2      | 0.5200    | 0.4308             |
| SULPHATE                     | 20         | 42         | 33        | 36        | 44        | 35.0000   | 8.4853             |
| NITRATE-N                    | 0.50       | <0.2       | <0.2      | <0.2      | <0.2      | 0.1000    | 0.2000             |
| AMMONIA-N                    | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | 2.4        | NA        | NA        | NA        | 2.4000    | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | 0.47       | NA        | NA        | NA        | 0.4700    | 0.0000             |
| DOC                          | 4.5/4.5    | NA         | NA        | NA        | 3.6       | 4.0500    | 0.4500             |
| PHENOLS                      | 0.007      | 0.002      | 0.002     | 0.002     | 0.003     | 0.0028    | 0.0023             |
| PCB (µg/L)                   | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| OIL AND GREASE               | <1         | NA         | NA        | NA        | NA        | 0.0000    | 0.0000             |
| ZINC                         | 0.01       | NA         | <0.01     | <0.01     | <0.01     | 0.0025    | 0.0043             |
| CADMIUM                      | 0.0002     | NA         | <0.005    | <0.005    | <0.005    | 0.0001    | 0.0001             |
| MANGANESE                    | 0.01       | NA         | <0.01     | 0.02      | <0.01     | 0.0075    | 0.0083             |
| COBALT                       | 0.03/0.03  | NA         | <0.01     | <0.01     | <0.01     | 0.0075    | 0.0130             |
| COPPER                       | <0.005     | NA         | <0.005    | <0.005    | <0.005    | 0.0000    | 0.0000             |
| IRON                         | 0.02       | NA         | 0.08      | 0.04      | <0.02     | 0.0350    | 0.0296             |
| LEAD                         | <0.05      | NA         | <0.05     | <0.05     | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.03/0.02  | NA         | <0.01     | <0.01     | 0.01      | 0.0088    | 0.0102             |
| NICKEL                       | 0.01/0.02  | NA         | <0.01     | <0.01     | <0.01     | 0.0038    | 0.0065             |
| BERYLLIUM                    | NA         | NA         | <0.01     | <0.01     | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | NA         | NA         | <0.02     | <0.02     | 0.02      | 0.0067    | 0.0094             |
| CALCIUM                      | NA         | 250        | 240       | 230       | 200       | 230.0000  | 18.7083            |
| VANADIUM                     | NA         | NA         | 0.04      | 0.04      | <0.01     | 0.0267    | 0.0189             |
| ALUMINUM                     | NA         | NA         | 0.46      | 0.46      | 0.5       | 0.4733    | 0.0189             |
| MAGNESIUM                    | NA         | 0.25/0.30  | 0.1       | 0.1       | 0.15      | 0.1563    | 0.0715             |
| BARIUM                       | NA         | NA         | 0.19      | 0.19      | 0.23      | 0.2033    | 0.0189             |
| POTASSIUM                    | NA         | 56         | 42        | 40        | 46        | 46.0000   | 6.1644             |
| STRONTIUM                    | NA         | NA         | 0.85      | 0.82      | 0.77      | 0.8133    | 0.0330             |
| SODIUM                       | NA         | 38/37      | 32        | 32        | 36        | 34.3750   | 2.4335             |
| ARSENIC (µg/L)               | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA         | NA        | NA        | NA        | -         | -                  |
| CATION EQUIVALENCE           | 0.00       | 15.56      | 14.50     | 13.95     | 12.79     |           |                    |
| ANION EQUIVALENCE            | 8.61       | 9.30       | 8.12      | 8.27      | 9.44      |           |                    |
| CHARGE BALANCE ERROR         | -99.98     | 25.19      | 28.24     | 25.59     | 15.05     |           |                    |
| BTX (µg/L)                   |            |            |           |           |           |           |                    |
| BENZENE                      | NA         | <2         | NA        | NA        | NA        | 0.0000    | 0.0000             |
| TOLUENE                      | NA         | 2          | NA        | NA        | NA        | 0.0000    | 0.0000             |
| XYLENE                       | NA         | <2         | NA        | NA        | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | 2          | -         | -         | -         | 2.0000    | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | B4-2 | B4-2 | B4-2 | GWREP2 | B4-2 | Average | Standard<br>Deviation |
|-------------------------|------|------|------|--------|------|---------|-----------------------|
| PAHs (µg/L)             |      |      |      |        |      |         |                       |
| NAPHTHALENE             | NA   | 1.5  | 1.3  | 1.3    | NA   | 1.3667  | 0.0943                |
| ACENAPHTHYLENE          | NA   | <0.1 | <0.1 | 0      | NA   | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | 0.8  | 0.8  | 0.8    | NA   | 0.8000  | 0.0000                |
| FLUORENE                | NA   | 0.3  | 0.3  | 0.3    | NA   | 0.3000  | 0.0000                |
| PHENANTHRENE            | NA   | 1.9  | 1.8  | 1.9    | NA   | 1.8667  | 0.0471                |
| ANTHRACENE              | NA   | 0.1  | 0.3  | 0.3    | NA   | 0.2333  | 0.0943                |
| FLUORANTHENE            | NA   | 2.1  | 2.4  | 2.5    | NA   | 2.3333  | 0.1700                |
| PYRENE                  | NA   | 2    | 2.6  | 2.8    | NA   | 2.4667  | 0.3399                |
| BENZO(a)ANTHRACENE      | NA   | 0.2  | 0.4  | 0.4    | NA   | 0.3333  | 0.0943                |
| CHRYSENE                | NA   | 0.2  | 0.5  | 0.6    | NA   | 0.4333  | 0.1700                |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 | 0.3  | 0.4    | NA   | 0.2333  | 0.1700                |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 | 0.4  | 0.5    | NA   | 0.3000  | 0.2160                |
| BENZO(a)PYRENE          | NA   | 0.1  | 0.7  | 0.8    | NA   | 0.5333  | 0.3091                |
| PERYLENE                | NA   | 0.1  | 0.1  | 0.1    | NA   | 0.1000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 | 0.2  | 0.4    | NA   | 0.2000  | 0.1633                |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 | <0.5 | 0      | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 | <0.5 | 0.5    | NA   | 0.1667  | 0.2357                |
| TOTAL PAHs              | -    | 9.3  | 12.1 | 13.6   | -    | 11.6667 | 1.7820                |

\* All Units are mg/L unless otherwise specified.  
NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | B5         | B5        | B5        | B5         | Average   | Standard Deviation |
|------------------------------|------------|-----------|-----------|------------|-----------|--------------------|
| SAMPLE DATE                  | 88/08/29   | 88/11/20  | 89/03/08  | 89/05/31   |           |                    |
| BAS REF NO.                  | 8809032-04 | 8811120-5 | 880371-5  | 8906045-10 |           |                    |
| SAMPLING LEVEL               | 1          | 2         | 2+        | 2+         |           |                    |
| pH                           | 12.50      | 12.57     | 12.71     | 12.4       | 12.5450   | 0.1128             |
| SPECIFIC CONDUCTANCE (µS/cm) | 4170       | 4090      | 5380      | 4350       | 4497.5000 | 518.1397           |
| TEMPERATURE (°C)             | 13         | 10        | 6         | 9          | 9.5000    | 2.5000             |
| DISSOLVED OXYGEN (ppm)       | 6.8        | NA        | 0         | 0          | 2.2667    | 3.2056             |
| DIC                          | NA         | NA        | NA        | NA         | -         | -                  |
| ALKALINITY                   | NA         | 760/760   | 680       | 590/580    | 675.0000  | 71.5309            |
| SULPHIDE                     | NA         | NA        | NA        | NA         | -         | -                  |
| TOTAL CYANIDE                | NA         | NA        | 0.090     | <0.002     | 0.0450    | 0.0450             |
| BROMIDE                      | <2         | <1/<1     | <1        | <1         | 0.0000    | 0.0000             |
| CHLORIDE                     | 90         | 83/84     | 154       | 186        | 128.3750  | 43.1963            |
| FLUORIDE                     | 0.75       | 1.4/1.2   | 0.60      | 0.2        | 0.7125    | 0.3943             |
| SULPHATE                     | 43         | 92/93     | 106       | 103        | 86.1250   | 25.3978            |
| NITRATE-N                    | <0.2       | 0.20/<0.2 | <0.2      | <0.2       | 0.0250    | 0.0433             |
| AMMONIA-N                    | NA         | NA        | NA        | NA         | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 3.2       | NA         | 3.2000    | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        | <0.001    | NA         | 0.0000    | 0.0000             |
| DOC                          | 3.5        | 4.0/4.0   | NA        | 4.1        | 3.8667    | 0.2625             |
| PHENOLS                      | 0.008      | 0.004     | 0.005     | 0.005      | 0.0055    | 0.0015             |
| PCB (µg/L)                   | NA         | NA        | NA        | NA         | -         | -                  |
| OIL AND GREASE               | 2          | NA        | NA        | NA         | 2.0000    | 0.0000             |
| ZINC                         | 0.01       | NA        | 0.01      | 0.01       | 0.0067    | 0.0047             |
| CADMIUM                      | 0.0018     | NA        | <0.005    | <0.005     | 0.0006    | 0.0008             |
| MANGANESE                    | 0.02       | NA        | <0.01     | <0.01      | 0.0067    | 0.0094             |
| COBALT                       | 0.03       | NA        | <0.01     | 0.02       | 0.0167    | 0.0125             |
| COPPER                       | 0.005      | NA        | 0.005     | 0.005      | 0.0033    | 0.0024             |
| IRON                         | 0.04       | NA        | 0.02/0.02 | 0.02       | 0.0267    | 0.0094             |
| LEAD                         | <0.05      | NA        | <0.05     | <0.05      | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.03       | NA        | 0.01      | 0.02       | 0.0167    | 0.0125             |
| NICKEL                       | 0.02       | NA        | <0.01     | <0.01      | 0.0067    | 0.0094             |
| BERYLLIUM                    | NA         | NA        | <0.01     | <0.01      | 0.0000    | 0.0000             |
| MOLYBDENUM                   | NA         | NA        | 0.04      | 0.03       | 0.0350    | 0.0050             |
| CALCIUM                      | NA         | 400       | 330       | 320        | 350.0000  | 35.5903            |
| VANADIUM                     | NA         | NA        | 0.03      | <0.01      | 0.0150    | 0.0150             |
| ALUMINUM                     | NA         | NA        | 0.44      | 0.46       | 0.4500    | 0.0100             |
| MAGNESIUM                    | NA         | 0.25      | 0.05      | 0.15       | 0.1500    | 0.0816             |
| BARIUM                       | NA         | NA        | 0.2       | 0.2        | 0.2000    | 0.0000             |
| POTASSIUM                    | NA         | 60        | 58        | 43         | 53.6667   | 7.5865             |
| STRONTIUM                    | NA         | NA        | 1.16      | 1.2        | 1.1800    | 0.0200             |
| SODIUM                       | NA         | 32        | 53        | 48         | 44.3333   | 8.9567             |
| ARSENIC (µg/L)               | NA         | NA        | NA        | NA         | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA        | NA         | -         | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA        | NA         | -         | -                  |
| CATION EQUIVALENCE           | 0.00       | 22.91     | 20.31     | 19.22      |           |                    |
| ANION EQUIVALENCE            | 11.88      | 0.00      | 13.34     | 13.24      |           |                    |
| CHARGE BALANCE ERROR         | -99.98     | 100.00    | 20.69     | 18.44      |           |                    |
| BTX (µg/L)                   |            |           |           |            |           |                    |
| BENZENE                      | NA         | NA        | <10/<10   | NA         | 0.0000    | 0.0000             |
| TOLUENE                      | NA         | NA        | 29/18     | NA         | 23.5000   | 0.0000             |
| XYLENE                       | NA         | NA        | <10/37    | NA         | 18.5000   | 0.0000             |
| TOTAL BTX                    | -          | -         | 29/55     | -          | 42.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | B5 | B5 | B5   | B5   | Average | Standard<br>Deviation |
|-------------------------|----|----|------|------|---------|-----------------------|
| PAHs (µg/L)             |    |    |      |      |         |                       |
| NAPHTHALENE             | NA | NA | 1.5  | 0.9  | 1.2000  | 0.3000                |
| ACENAPHTHYLENE          | NA | NA | 0.1  | <0.1 | 0.0500  | 0.0500                |
| ACENAPHTHENE            | NA | NA | 1.1  | 0.9  | 1.0000  | 0.1000                |
| FLUORENE                | NA | NA | 0.4  | 0.3  | 0.3500  | 0.0500                |
| PHENANTHRENE            | NA | NA | 2.6  | 2    | 2.3000  | 0.3000                |
| ANTHRACENE              | NA | NA | 0.4  | 0.2  | 0.3000  | 0.1000                |
| FLUORANTHENE            | NA | NA | 3.3  | 2.4  | 2.8500  | 0.4500                |
| PYRENE                  | NA | NA | 3.1  | 2.3  | 2.7000  | 0.4000                |
| BENZO(a)ANTHRACENE      | NA | NA | 0.2  | <0.2 | 0.1000  | 0.1000                |
| CHRYSENE                | NA | NA | 0.3  | 0.2  | 0.2500  | 0.0500                |
| BENZO(b)FLUORANTHENE    | NA | NA | <0.2 | <0.2 | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -  | -  | 13   | 9.2  | 11.1000 | 1.9000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed



## Appendix 6: Groundwater

| PIEZOMETER                                       | C1         | C1        | C1       | C1        | Average   | Standard Deviation |
|--------------------------------------------------|------------|-----------|----------|-----------|-----------|--------------------|
| SAMPLE DATE                                      | 88/08/09   | 88/11/20  | 89/03/10 | 89/05/30  |           |                    |
| BAS REF NO.                                      | 8808054-01 | 8811120-6 | 890377-5 | 8906008-3 |           |                    |
| SAMPLING LEVEL                                   | 1          | 1         | 1        | 1         |           |                    |
| pH                                               | 9.23       | 8.65      | 8.10     | 8.20      | 8.5450    | 0.4465             |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 2740       | 4910      | 6370     | 2910      | 4232.5000 | 1500.3729          |
| TEMPERATURE ( $^{\circ}\text{C}$ )               | 14         | 13        | 10       | 13        | 12.5000   | 1.5000             |
| DISSOLVED OXYGEN (ppm)                           | 4          | NA        | 5.15     | 3.4       | 4.1833    | 0.7261             |
| DIC                                              | NA         | NA        | NA       | NA        | -         | -                  |
| ALKALINITY                                       | NA         | 76        | 108/109  | 105       | 96.5000   | 14.5659            |
| SULPHIDE                                         | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL CYANIDE                                    | NA         | NA        | NA       | NA        | -         | -                  |
| BROMIDE                                          | <2         | <1        | <1       | <1        | 0.0000    | 0.0000             |
| CHLORIDE                                         | 19.0       | 17        | 19.0     | 14.2      | 17.3000   | 1.9672             |
| FLUORIDE                                         | 1.25       | 1.8       | 6.2      | 0.6       | 2.4625    | 2.1993             |
| SULPHATE                                         | 2400       | 2100      | 2300     | 2100      | 2225.0000 | 129.9038           |
| NITRATE-N                                        | <0.5       | <0.2      | <0.2     | 0.2       | 0.0500    | 0.0866             |
| AMMONIA-N                                        | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN                          | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL PHOSPHOROUS                                | NA         | NA        | NA       | NA        | -         | -                  |
| DOC                                              | 17.5       | 7         | 8.3      | 6.8       | 9.9000    | 4.4255             |
| PHENOLS                                          | 0.005      | 0.002     | <0.001   | 0.004     | 0.0028    | 0.0019             |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA         | NA        | NA       | NA        | -         | -                  |
| OIL AND GREASE                                   | 6          | NA        | NA       | NA        | 6.0000    | 0.0000             |
| ZINC                                             | 0.02       | NA        | NA       | NA        | 0.0200    | 0.0000             |
| CADMIUM                                          | 0.0010     | NA        | NA       | NA        | 0.0010    | 0.0000             |
| MANGANESE                                        | 0.72       | NA        | NA       | NA        | 0.7200    | 0.0000             |
| COBALT                                           | 0.03       | NA        | NA       | NA        | 0.0300    | 0.0000             |
| COPPER                                           | <0.005     | NA        | NA       | NA        | 0.0000    | 0.0000             |
| IRON                                             | 0.12       | NA        | NA       | NA        | 0.1200    | 0.0000             |
| LEAD                                             | <0.05      | NA        | NA       | NA        | 0.0000    | 0.0000             |
| CHROMIUM                                         | 0.04       | NA        | NA       | NA        | 0.0400    | 0.0000             |
| NICKEL                                           | 0.02       | NA        | NA       | NA        | 0.0200    | 0.0000             |
| BERYLLIUM                                        | NA         | NA        | NA       | NA        | -         | -                  |
| MOLYBDENUM                                       | NA         | NA        | NA       | NA        | -         | -                  |
| CALCIUM                                          | NA         | 500/490   | 550      | 490       | 511.6667  | 27.1825            |
| VANADIUM                                         | NA         | NA        | NA       | NA        | -         | -                  |
| ALUMINUM                                         | NA         | NA        | NA       | NA        | -         | -                  |
| MAGNESIUM                                        | NA         | 56        | 59       | 53        | 56.0000   | 2.4495             |
| BARIUM                                           | NA         | NA        | NA       | NA        | -         | -                  |
| POTASSIUM                                        | NA         | 520       | 690      | 380       | 530.0000  | 126.7544           |
| STRONTIUM                                        | NA         | NA        | NA       | NA        | -         | -                  |
| SODIUM                                           | NA         | 101       | 139      | 86        | 108.6667  | 22.3060            |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA        | -         | -                  |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA         | NA        | NA       | NA        | -         | -                  |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA        | -         | -                  |
| CATION EQUIVALENCE                               | 0.00       | 47.00     | 55.99    | 42.27     |           |                    |
| ANION EQUIVALENCE                                | 50.50      | 44.96     | 49.51    | 45.18     |           |                    |
| CHARGE BALANCE ERROR                             | -99.98     | 2.22      | 6.15     | -3.32     |           |                    |
| BTX ( $\mu\text{g}/\text{L}$ )                   |            |           |          |           |           |                    |
| BENZENE                                          | NA         | NA        | NA       | NA        | -         | -                  |
| TOLUENE                                          | NA         | NA        | NA       | NA        | -         | -                  |
| XYLENE                                           | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL BTX                                        | -          | -         | -        | -         | -         | -                  |

## Appendix 6: Groundwater

| PIEZOMETER              |    |    |    |    | Standard |           |
|-------------------------|----|----|----|----|----------|-----------|
|                         | C1 | C1 | C1 | C1 | Average  | Deviation |
| PAHs (µg/L)             |    |    |    |    |          |           |
| NAPHTHALENE             | NA | NA | NA | NA | -        | -         |
| ACENAPHTHYLENE          | NA | NA | NA | NA | -        | -         |
| ACENAPHTHENE            | NA | NA | NA | NA | -        | -         |
| FLUORENE                | NA | NA | NA | NA | -        | -         |
| PHENANTHRENE            | NA | NA | NA | NA | -        | -         |
| ANTHRACENE              | NA | NA | NA | NA | -        | -         |
| FLUORANTHENE            | NA | NA | NA | NA | -        | -         |
| PYRENE                  | NA | NA | NA | NA | -        | -         |
| BENZO(a)ANTHRACENE      | NA | NA | NA | NA | -        | -         |
| CHRYSENE                | NA | NA | NA | NA | -        | -         |
| BENZO(b)FLUORANTHENE    | NA | NA | NA | NA | -        | -         |
| BENZO(k)FLUORANTHENE    | NA | NA | NA | NA | -        | -         |
| BENZO(a)PYRENE          | NA | NA | NA | NA | -        | -         |
| PERYLENE                | NA | NA | NA | NA | -        | -         |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | NA | NA | -        | -         |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | NA | NA | -        | -         |
| BENZO(g,h,i)PERYLENE    | NA | NA | NA | NA | -        | -         |
| TOTAL PAHs              | -  | -  | -  | -  | -        | -         |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                                       | C2-1       | C2-1      | C2-1     | C2-1      | Average   | Standard Deviation |
|--------------------------------------------------|------------|-----------|----------|-----------|-----------|--------------------|
| SAMPLE DATE                                      | 08/10/88   | 88/11/17  | 89/03/10 | 89/05/31  |           |                    |
| BAS REF NO.                                      | 8808064-02 | 8811120-7 | 890377-6 | 8906045-1 |           |                    |
| SAMPLING LEVEL                                   | 1          | 1         | 1        | 1         |           |                    |
| pH                                               | 7.00       | 7.20      | 7.06     | 7.31      | 7.1425    | 0.1209             |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 1710       | 2840      | 3640     | 3310      | 2875.0000 | 730.2226           |
| TEMPERATURE ( $^{\circ}\text{C}$ )               | 16         | 10        | 9        | 12        | 11.7500   | 2.6810             |
| DISSOLVED OXYGEN (ppm)                           | 7          | NA        | 6.1      | 7.5       | 6.8667    | 0.5793             |
| DIC                                              | NA         | NA        | NA       | NA        | -         | -                  |
| ALKALINITY                                       | NA         | 174       | 176      | 165       | 171.6667  | 4.7842             |
| SULPHIDE                                         | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL CYANIDE                                    | NA         | NA        | NA       | NA        | -         | -                  |
| BROMIDE                                          | <0.2       | <0.5      | <1       | <1        | 0.0000    | 0.0000             |
| CHLORIDE                                         | 33         | 2.5       | 25       | 26        | 21.6250   | 11.4639            |
| FLUORIDE                                         | 1.0        | 1.25      | 0.80     | 0.2       | 0.8125    | 0.3879             |
| SULPHATE                                         | 260        | 1260      | 1270     | 1400      | 1047.5000 | 458.0052           |
| NITRATE-N                                        | <0.2       | <0.1      | <0.2     | <0.2      | 0.0000    | 0.0000             |
| AMMONIA-N                                        | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN                          | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL PHOSPHOROUS                                | NA         | NA        | NA       | NA        | -         | -                  |
| DOC                                              | 6.0/6.5    | 6.5       | 6.4      | 6.2       | 6.3375    | 0.1192             |
| PHENOLS                                          | <0.001     | <0.001    | <0.001   | <0.001    | 0.0000    | 0.0000             |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA         | NA        | NA       | NA        | -         | -                  |
| OIL AND GREASE                                   | 3          | NA        | NA       | NA        | 3.0000    | 0.0000             |
| ZINC                                             | 0.02       | NA        | NA       | NA        | 0.0200    | 0.0000             |
| CADMIUM                                          | 0.0020     | NA        | NA       | NA        | 0.0020    | -                  |
| MANGANESE                                        | 3.4        | NA        | NA       | NA        | 3.4000    | -                  |
| COBALT                                           | 0.04       | NA        | NA       | NA        | 0.0400    | 0.0000             |
| COPPER                                           | 0.005      | NA        | NA       | NA        | 0.0050    | 0.0000             |
| IRON                                             | 0.64       | NA        | NA       | NA        | 0.6400    | 0.0000             |
| LEAD                                             | <0.05      | NA        | NA       | NA        | 0.0000    | 0.0000             |
| CHROMIUM                                         | 0.02       | NA        | NA       | NA        | 0.0200    | 0.0000             |
| NICKEL                                           | 0.02       | NA        | NA       | NA        | 0.0200    | 0.0000             |
| BERYLLIUM                                        | NA         | NA        | NA       | NA        | -         | -                  |
| MOLYBDENUM                                       | NA         | NA        | NA       | NA        | -         | -                  |
| CALCIUM                                          | NA         | 370       | 400      | 340       | 370.0000  | 24.4949            |
| VANADIUM                                         | NA         | NA        | NA       | NA        | -         | -                  |
| ALUMINUM                                         | NA         | NA        | NA       | NA        | -         | -                  |
| MAGNESIUM                                        | NA         | 89/88     | 89       | 90        | 89.1667   | 0.6236             |
| BARIUM                                           | NA         | NA        | NA       | NA        | -         | -                  |
| POTASSIUM                                        | NA         | 19.0/21   | 22       | 24        | 22.0000   | 1.6330             |
| STRONTIUM                                        | NA         | NA        | NA       | NA        | -         | -                  |
| SODIUM                                           | NA         | 92/93     | 151      | 145       | 129.5000  | 26.2774            |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA        | -         | -                  |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA         | NA        | NA       | NA        | -         | -                  |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA        | -         | -                  |
| CATION EQUIVALENCE                               | 0.02       | 30.28     | 34.41    | 31.29     |           |                    |
| ANION EQUIVALENCE                                | 6.34       | 28.04     | 28.91    | 31.53     |           |                    |
| CHARGE BALANCE ERROR                             | -99.28     | 3.83      | 8.70     | -0.38     |           |                    |
| BTX ( $\mu\text{g}/\text{L}$ )                   |            |           |          |           |           |                    |
| BENZENE                                          | NA         | NA        | NA       | NA        | -         | -                  |
| TOLUENE                                          | NA         | NA        | NA       | NA        | -         | -                  |
| XYLENE                                           | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL BTX                                        | -          | -         | -        | -         | -         | -                  |

## Appendix 6: Groundwater

| PIEZOMETER              | C2-1 | C2-1 | C2-1 | C2-1 | Standard |           |
|-------------------------|------|------|------|------|----------|-----------|
|                         |      |      |      |      | Average  | Deviation |
| PAHs (µg/L)             |      |      |      |      |          |           |
| NAPHTHALENE             | NA   | NA   | NA   | NA   | -        | -         |
| ACENAPHTHYLENE          | NA   | NA   | NA   | NA   | -        | -         |
| ACENAPHTHENE            | NA   | NA   | NA   | NA   | -        | -         |
| FLUORENE                | NA   | NA   | NA   | NA   | -        | -         |
| PHENANTHRENE            | NA   | NA   | NA   | NA   | -        | -         |
| ANTHRACENE              | NA   | NA   | NA   | NA   | -        | -         |
| FLUORANTHENE            | NA   | NA   | NA   | NA   | -        | -         |
| PYRENE                  | NA   | NA   | NA   | NA   | -        | -         |
| BENZO(a)ANTHRACENE      | NA   | NA   | NA   | NA   | -        | -         |
| CHRYSENE                | NA   | NA   | NA   | NA   | -        | -         |
| BENZO(b)FLUORANTHENE    | NA   | NA   | NA   | NA   | -        | -         |
| BENZO(k)FLUORANTHENE    | NA   | NA   | NA   | NA   | -        | -         |
| BENZO(a)PYRENE          | NA   | NA   | NA   | NA   | -        | -         |
| PERYLENE                | NA   | NA   | NA   | NA   | -        | -         |
| INDENO(1,2,3-C,D)PYRENE | NA   | NA   | NA   | NA   | -        | -         |
| DIBENZO(a,h)ANTHRACENE  | NA   | NA   | NA   | NA   | -        | -         |
| BENZO(g,h,i)PERYLENE    | NA   | NA   | NA   | NA   | -        | -         |
| TOTAL PAHs              | -    | -    | -    | -    | -        | -         |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

Appendix 6: Groundwater

| PIEZOMETER     | C2-2 | C2-2 | C2-2 |
|----------------|------|------|------|
| SAMPLE DATE    | DRY  | DRY  | DRY  |
| BAS REF NO.    |      |      |      |
| SAMPLING LEVEL |      |      |      |

## Appendix 6: Groundwater

| PIEZOMETER                   | C3         | C3        | C3         | GWREPI   | C3        | Average   | Standard Deviation |
|------------------------------|------------|-----------|------------|----------|-----------|-----------|--------------------|
|                              |            |           |            | (C3)     |           |           |                    |
| SAMPLE DATE                  | 88/08/09   | 88/11/17  | 89/03/08   | 89/03/08 | 89/05/31  |           |                    |
| BAS REF NO.                  | 8808054-02 | 8811092-2 | 880371-1   | 890371-2 | 8906045-2 |           |                    |
| SAMPLING LEVEL               | 1          | 1         | 1          | 1        | 1         |           |                    |
| pH                           | 11.57      | 11.47     | 12.16      | NA       | 11.97     | 11.7925   | 0.2829             |
| SPECIFIC CONDUCTANCE (µS/cm) | 750        | 1160      | 1720       | NA       | 1910      | 1095.2900 | 769.7988           |
| TEMPERATURE (°C)             | 12.5       | 8         | 7          | NA       | 11        | 9.6250    | 2.2185             |
| DISSOLVED OXYGEN (ppm)       | 9.6        | NA        | 0.25       | 2.85     | 5.1       | 4.4500    | 3.4331             |
| DIC                          | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| ALKALINITY                   | NA         | 117       | 240        | 230      | 250       | 209.2500  | 53.7279            |
| SULPHIDE                     | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| TOTAL CYANIDE                | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| BROMIDE                      | <0.5       | <0.2      | <0.2       | <0.2     | <0.5/<0.5 | 0.0000    | 0.0000             |
| CHLORIDE                     | 28         | 28        | 41         | 43       | 34/34     | 34.8000   | 6.3056             |
| FLUORIDE                     | 2.70       | 1.64      | 3.3        | 3.4      | 5.4/5.1   | 3.2580    | 1.1764             |
| SULPHATE                     | 130        | 310       | 104        | 105      | 125/126   | 154.9000  | 78.2575            |
| NITRATE-N                    | <0.2       | 0.32      | <0.05      | <0.05    | <0.1/<0.1 | 0.0640    | 0.1280             |
| AMMONIA-N                    | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| TOTAL PHOSPHOROUS            | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| DOC                          | 29/30      | 20        | 94/94      | 97       | 101       | 68.3000   | 35.7542            |
| PHENOLS                      | 0.4        | 0.053     | 0.29       | 0.3      | 0.129     | 0.2344    | 0.1256             |
| PCB (µg/L)                   | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| OIL AND GREASE               | 9          | NA        | NA         | NA       | NA        | 9.0000    | 0.0000             |
| ZINC                         | 0.01       | NA        | NA         | NA       | NA        | 0.0100    | 0.0000             |
| CADMIUM                      | 0.0004     | NA        | NA         | NA       | NA        | 0.0004    | 0.0000             |
| MANGANESE                    | <0.01      | NA        | NA         | NA       | NA        | 0.0000    | 0.0000             |
| COBALT                       | 0.01       | NA        | NA         | NA       | NA        | 0.0100    | 0.0000             |
| COPPER                       | <0.005     | NA        | NA         | NA       | NA        | 0.0000    | 0.0000             |
| IRON                         | 0.02       | NA        | NA         | NA       | NA        | 0.0200    | 0.0000             |
| LEAD                         | <0.05      | NA        | NA         | NA       | NA        | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.01       | NA        | NA         | NA       | NA        | 0.0100    | 0.0000             |
| NICKEL                       | 0.01       | NA        | NA         | NA       | NA        | 0.0100    | 0.0000             |
| BERYLLIUM                    | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| MOLYBDENUM                   | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| CALCIUM                      | NA         | 112       | 114/115    | NA       | 145       | 126.6250  | 13.8626            |
| VANADIUM                     | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| ALUMINUM                     | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| MAGNESIUM                    | NA         | 0.5       | 0.010/0.15 | NA       | 0.2       | 0.2013    | 0.1827             |
| BARIUM                       | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| POTASSIUM                    | NA         | 71        | 37/38      | NA       | 46        | 49.1250   | 12.9826            |
| STRONTIUM                    | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| SODIUM                       | NA         | 53        | 29/30      | NA       | 28        | 35.8750   | 10.0522            |
| ARSENIC (µg/L)               | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| CATION EQUIVALENCE           | 0.00       | 9.75      | 7.96       | 0.00     | 9.65      | -         | -                  |
| ANION EQUIVALENCE            | 3.50       | 8.42      | 5.72       | 5.70     | 6.07      | -         | -                  |
| CHARGE BALANCE ERROR         | -99.96     | 7.34      | 16.39      | -100.00  | 22.76     | -         | -                  |
| BTX (µg/L)                   |            |           |            |          |           |           |                    |
| BENZENE                      | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| TOLUENE                      | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| XYLENE                       | NA         | NA        | NA         | NA       | NA        | -         | -                  |
| TOTAL BTX                    | -          | -         | -          | -        | -         | -         | -                  |

## Appendix 6: Groundwater

| PIEZOMETER              | C3 | C3 | C3 | GWREP1 | C3 | Average | Standard<br>Deviation |
|-------------------------|----|----|----|--------|----|---------|-----------------------|
| PAHs (µg/L)             |    |    |    |        |    |         |                       |
| NAPHTHALENE             | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| FLUORENE                | NA | NA | NA | NA     | NA | 0.1000  | 0.0000                |
| PHENANTHRENE            | NA | NA | NA | NA     | NA | 0.1000  | 0.0000                |
| ANTHRACENE              | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA | NA | NA | NA     | NA | 0.2000  | 0.0000                |
| PYRENE                  | NA | NA | NA | NA     | NA | 0.3000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| CHRYSENE                | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| PERYLENE                | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA | NA | NA | NA     | NA | 0.0000  | 0.0000                |
| TOTAL PAHs              | -  | -  | -  | -      | -  | -       | -                     |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | C4         | C4         | C4       | C4        | Average   | Standard Deviation |
|------------------------------|------------|------------|----------|-----------|-----------|--------------------|
| SAMPLE DATE                  | 88/08/10   | 88/11/20   | 89/03/08 | 89/05/31  |           |                    |
| BAS REF NO.                  | 8808065-05 | 8811120-11 | 880371-9 | 8906046-1 |           |                    |
| SAMPLING LEVEL               | 3          | 3          | 3        | 3         |           |                    |
| pH                           | 9.07       | 8.18       | 9.02     | 8.61      | 8.7200    | 0.3592             |
| SPECIFIC CONDUCTANCE (µS/cm) | 1480       | 2360       | 2810     | 2230      | 1630.5900 | 1051.6785          |
| TEMPERATURE (°C)             | 12         | 10         | 4        | 10        | 9.0000    | 3.0000             |
| DISSOLVED OXYGEN (ppm)       | NA         | NA         | 2.4      | 5.2       | 3.8000    | 1.4000             |
| DIC                          | 37         | 80         | 39       | 50        | 51.5000   | 17.1828            |
| ALKALINITY                   | 126        | 320        | 159/159  | 197       | 200.5000  | 73.4251            |
| SULPHIDE                     | 32         | NA         | 0.04     | <0.05     | 10.6800   | 15.0755            |
| TOTAL CYANIDE                | 0.043      | 0.07       | 0.059    | 0.02      | 0.0480    | 0.0188             |
| BROMIDE                      | <0.50      | <1         | <1       | <0.5      | 0.0000    | 0.0000             |
| CHLORIDE                     | 460        | 280        | 470      | 330       | 385.0000  | 82.0061            |
| FLUORIDE                     | 1.50/1.50  | 2.4        | 1.40     | 1.4       | 1.6750    | 0.4206             |
| SULPHATE                     | 230/230    | 320        | 240      | 240       | 257.5000  | 36.3146            |
| NITRATE-N                    | <0.10      | <0.2       | <0.2     | <0.1      | 0.0000    | 0.0000             |
| AMMONIA-N                    | 0.02       | 0.13       | 0.28     | 0.156     | 0.1465    | 0.0924             |
| TOTAL KJELDAHL NITROGEN      | 0.57       | 0.69       | 0.72     | 0.79      | 0.6925    | 0.0795             |
| TOTAL PHOSPHOROUS            | 0.031      | 0.11       | 0.018    | 0.02      | 0.0448    | 0.0380             |
| DOC                          | 26         | 22         | 31       | 26        | 26.2500   | 3.1918             |
| PHENOLS                      | 0.005      | <0.001     | 0.005    | 0.005     | 0.0038    | 0.0022             |
| PCB (µg/L)                   | <0.1       | NA         | <0.02    | <0.02     | 0.0000    | 0.0000             |
| OIL AND GREASE               | NA         | NA         | NA       | NA        | -         | -                  |
| ZINC                         | 0.02       | 0.08       | 0.01     | 0.03      | 0.0350    | 0.0269             |
| CADMIUM                      | 0.0004     | <0.005     | <0.005   | <0.005    | 0.0001    | 0.0002             |
| MANGANESE                    | 0.16       | 0.28       | 0.37     | 0.28      | 0.3175    | 0.1110             |
| COBALT                       | <0.01      | 0.01       | <0.01    | <0.01     | 0.0000    | 0.0000             |
| COPPER                       | <0.005     | 0.005      | 0.005    | 0.005     | 0.0038    | 0.0041             |
| IRON                         | 0.06       | 0.26       | 0.26     | 0.26      | 0.2400    | 0.1281             |
| LEAD                         | <0.05      | <0.05      | <0.05    | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | <0.01      | <0.01      | <0.01    | <0.01     | 0.0000    | 0.0000             |
| NICKEL                       | <0.01      | <0.01      | <0.01    | <0.01     | 0.0000    | 0.0000             |
| BERYLLIUM                    | <0.01      | <0.01      | <0.01    | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | 0.06/0.06  | 0.06       | 0.06     | 0.06      | 0.0600    | 0.0000             |
| CALCIUM                      | 74/76      | 82         | 82       | 82        | 69.5000   | 10.7355            |
| VANADIUM                     | 0.02/0.01  | <0.01      | 0.01     | 0.01      | 0.0038    | 0.0065             |
| ALUMINUM                     | 0.14/0.14  | 0.16       | 0.08     | 0.08      | 0.1050    | 0.0477             |
| MAGNESIUM                    | 40/39      | 87         | 59       | 59        | 59.3750   | 17.4118            |
| BARIUM                       | 0.06/0.06  | 0.04       | 0.04     | 0.04      | 0.0425    | 0.0109             |
| POTASSIUM                    | 46         | 52         | 52       | 45        | 48.7500   | 3.2692             |
| STRONTIUM                    | 0.37/0.38  | 0.44       | 0.40     | 0.3       | 0.3788    | 0.0510             |
| SODIUM                       | 250        | 186        | 300      | 220       | 239.0000  | 41.8688            |
| ARSENIC (µg/L)               | 3          | 5/4        | 8        | 7/10      | 6.0000    | 2.3184             |
| SELENIUM (µg/L)              | <1         | <1/<2      | <1       | <1/<2     | 0.0000    | 0.0000             |
| MERCURY (µg/L)               | <0.05      | 0.05       | 0.20     | 0.35      | 0.1500    | 0.1369             |
| CATION EQUIVALENCE           | 19.06      | 20.70      | 22.64    | 17.66     |           |                    |
| ANION EQUIVALENCE            | 19.02      | 17.76      | 19.84    | 16.27     |           |                    |
| CHARGE BALANCE ERROR         | 0.10       | 7.66       | 6.59     | 4.08      |           |                    |
| BTX (µg/L)                   |            |            |          |           |           |                    |
| BENZENE                      | NA         | <2         | 230      | <2        | 76.6667   | 108.4230           |
| TOLUENE                      | NA         | <1         | 57       | 1         | 19.3333   | 26.6375            |
| XYLENE                       | NA         | <2         | 188      | 3         | 63.6667   | 87.9255            |
| BTX                          | -          | 0          | 475      | 4         | 159.6667  | 222.9803           |



## Appendix 6: Groundwater

| PIEZOMETER              | C4    | C4   | C4   | C4   | Average | Standard<br>Deviation |
|-------------------------|-------|------|------|------|---------|-----------------------|
| PAHs (µg/L)             |       |      |      |      |         |                       |
| NAPHTHALENE             | 0.73  | <0.1 | 22   | 0.4  | 5.7825  | 9.3667                |
| ACENAPHTHYLENE          | 0.28  | <0.1 | 12   | 5    | 4.3200  | 4.8587                |
| ACENAPHTHENE            | 0.14  | <0.1 | 3.0  | 2.6  | 1.4350  | 1.3732                |
| FLUORENE                | 0.53  | <0.1 | 7.1  | 5.7  | 3.3325  | 3.1128                |
| PHENANTHRENE            | 1.59  | <0.1 | 11   | 0.4  | 3.2475  | 4.5140                |
| ANTHRACENE              | 0.87  | 0.3  | 2.2  | 1.4  | 1.1925  | 0.6998                |
| FLUORANTHENE            | 6.6   | 0.2  | 3.6  | 2.6  | 3.2500  | 2.2951                |
| PYRENE                  | 3.7   | 0.2  | 2.6  | 1.9  | 2.1000  | 1.2708                |
| BENZO(a)ANTHRACENE      | 1.19  | <0.1 | 0.5  | 0.3  | 0.4975  | 0.4376                |
| CHRYSENE                | 1.3   | <0.1 | 0.6  | 0.3  | 0.5500  | 0.4822                |
| BENZO(b)FLUORANTHENE    | 0.87  | <0.2 | 0.4  | <0.2 | 0.3175  | 0.3584                |
| BENZO(k)FLUORANTHENE    | 0.51  | <0.1 | 0.5  | <0.2 | 0.2525  | 0.2525                |
| BENZO(a)PYRENE          | 0.53  | <0.1 | 0.7  | <0.5 | 0.3075  | 0.3133                |
| PERYLENE                | 0.12  | <0.1 | 0.1  | <0.5 | 0.0550  | 0.0555                |
| INDENO(1,2,3-C,D)PYRENE | 0.43  | <0.1 | 0.3  | <0.5 | 0.1825  | 0.1882                |
| DIBENZO(a,h)ANTHRACENE  | 0.15  | <0.5 | <0.5 | <0.5 | 0.0375  | 0.0650                |
| BENZO(g,h,i)PERYLENE    | 0.47  | <0.5 | <0.5 | <0.5 | 0.1175  | 0.2035                |
| TOTAL PAHs              | 20.01 | 0.7  | 66.6 | 20.6 | 26.9775 | 24.2367               |

## Appendix 6: Groundwater

| PIEZOMETER                                       | D1-1       | D1-1      | D1-1     | D1-1       | Average   | Standard Deviation |
|--------------------------------------------------|------------|-----------|----------|------------|-----------|--------------------|
| SAMPLE DATE                                      | 88/08/10   | 88/11/17  | 89/03/07 | 89/05/31   |           |                    |
| BAS REF NO.                                      | 8808064-03 | 8811092-7 | 880371-7 | 8906008-10 |           |                    |
| SAMPLING LEVEL                                   | 1          | 2+        | 2+       | 2+         |           |                    |
| pH                                               | 7.14       | 7.20      | 7.16     | 8.09       | 7.3975    | 0.4004             |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 1240       | 2040      | 2330     | 2150       | 1940.0000 | 417.1930           |
| TEMPERATURE ( $^{\circ}\text{C}$ )               | 13         | 8         | 7        | 11         | 9.7500    | 2.3848             |
| DISSOLVED OXYGEN                                 | 4          | NA        | 1.1      | 1.2        | 2.1000    | 1.3441             |
| DIC                                              | NA         | NA        | NA       | NA         | -         | -                  |
| ALKALINITY                                       | NA         | 139       | 133      | 126/124    | 132.3333  | 5.7349             |
| SULPHIDE                                         | NA         | NA        | NA       | NA         | -         | -                  |
| TOTAL CYANIDE                                    | NA         | <0.002    | <0.005   | <0.002     | 0.0000    | 0.0000             |
| BROMIDE                                          | <1/<1      | <1        | <1       | <1         | 0.0000    | 0.0000             |
| CHLORIDE                                         | 350/350    | 380       | 410      | 390        | 382.5000  | 21.6506            |
| FLUORIDE                                         | 0.60       | 1.8       | 0.20     | 0.4        | 0.7500    | 0.6225             |
| SULPHATE                                         | 220/220    | 210       | 186      | 192        | 202.0000  | 13.6382            |
| NITRATE-N                                        | 0.20/<0.4  | <0.2      | <0.2     | <0.2       | 0.0250    | 0.0433             |
| AMMONIA-N                                        | NA         | NA        | NA       | NA         | -         | -                  |
| TOTAL KJELDAHL NITROGEN                          | NA         | 1.17      | NA       | NA         | 1.1700    | 0.0000             |
| TOTAL PHOSPHOROUS                                | NA         | 0.22      | NA       | NA         | 0.2200    | 0.0000             |
| DOC                                              | 14.0       | NA        | NA       | 11.6/11.4  | 12.7500   | 1.2500             |
| PHENOLS                                          | 0.001      | 0.001     | <0.001   | 0.001      | 0.0005    | 0.0005             |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA         | 0.012     | <0.1     | <0.02      | 0.0040    | 0.0057             |
| OIL AND GREASE                                   | 4          | NA        | NA       | NA         | 4.0000    | 0.0000             |
| ZINC                                             | 0.02       | NA        | 0.02     | 0.01       | 0.0167    | 0.0047             |
| CADMIUM                                          | 0.0026     | NA        | <0.005   | <0.005     | 0.0009    | 0.0012             |
| MANGANESE                                        | 3.9        | NA        | 5.7/5.5  | 5.1        | 4.8667    | 0.7134             |
| COBALT                                           | 0.02       | NA        | <0.01    | 0.01       | 0.0100    | 0.0082             |
| COPPER                                           | 0.005      | NA        | 0.005    | 0.01       | 0.0067    | 0.0024             |
| IRON                                             | 0.04       | NA        | 1.18     | 1.04       | 0.7533    | 0.5076             |
| LEAD                                             | <0.05      | NA        | <0.05    | <0.05      | 0.0000    | 0.0000             |
| CHROMIUM                                         | 0.02       | NA        | 0.01     | 0.02       | 0.0167    | 0.0047             |
| NICKEL                                           | 0.01       | NA        | 0.01     | 0.01       | 0.0100    | 0.0000             |
| BERYLLIUM                                        | NA         | NA        | <0.01    | <0.02      | 0.0000    | 0.0000             |
| MOLYBDENUM                                       | NA         | NA        | 0.04     | <0.02      | 0.0200    | 0.0200             |
| CALCIUM                                          | NA         | 240       | 230/230  | 210        | 226.6667  | 12.4722            |
| VANADIUM                                         | NA         | NA        | 0.02     | 0.02       | 0.0200    | 0.0000             |
| ALUMINUM                                         | NA         | NA        | 0.30     | 0.2        | 0.2500    | 0.0500             |
| MAGNESIUM                                        | NA         | 25        | 27       | 26         | 26.0000   | 0.8165             |
| BARIUM                                           | NA         | NA        | 0.12     | 0.1        | 0.1100    | 0.0100             |
| POTASSIUM                                        | NA         | 27        | 29/28    | 28         | 27.8333   | 0.6236             |
| STRONTIUM                                        | NA         | NA        | 1.40     | 1.29       | 1.3450    | 0.0550             |
| SODIUM                                           | NA         | 65        | 64       | 60         | 63.0000   | 2.1602             |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA         | -         | -                  |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA         | NA        | NA       | NA         | -         | -                  |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA         | -         | -                  |
| CATION EQUIVALENCE                               | 0.00       | 17.55     | 17.29    | 16.00      |           |                    |
| ANION EQUIVALENCE                                | 14.46      | 16.48     | 16.77    | 16.25      |           |                    |
| CHARGE BALANCE ERROR                             | -99.98     | 3.15      | 1.53     | -0.76      |           |                    |
| BTX ( $\mu\text{g}/\text{L}$ )                   |            |           |          |            |           |                    |
| BENZENE                                          | NA         | 7         | NA       | NA         | 7.0000    | 0.0000             |
| TOLUENE                                          | NA         | <1        | NA       | NA         | 0.0000    | 0.0000             |
| XYLENE                                           | NA         | <2        | NA       | NA         | 0.0000    | 0.0000             |
| TOTAL BTX                                        | -          | 7         | -        | -          | 7.0000    | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | D1-1 | D1-1      | D1-1 | D1-1 | Average | Standard<br>Deviation |
|-------------------------|------|-----------|------|------|---------|-----------------------|
| PAHs (µg/L)             |      |           |      |      |         |                       |
| NAPHTHALENE             | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| FLUORENE                | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| ANTHRACENE              | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA   | 0.1/0.1   | <0.1 | NA   | 0.0500  | 0.0500                |
| PYRENE                  | NA   | <0.2/0.3  | 0.2  | NA   | 0.1000  | 0.1000                |
| BENZO(a)ANTHRACENE      | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| CHRYSENE                | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA   | <0.2/<0.2 | <0.2 | NA   | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| PERYLENE                | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1/<0.1 | <0.1 | NA   | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5/<0.5 | <0.5 | NA   | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5/<0.5 | <0.5 | NA   | 0.0000  | 0.0000                |
| TOTAL PAHs              | -    | 0.1/0.4   | 0.2  | -    | 0.2250  | 0.0250                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | D1-2       | GWREP1     | GWREP2     | D1-2      | D1-2     | D1-2       | Average   | Standard Deviation |
|------------------------------|------------|------------|------------|-----------|----------|------------|-----------|--------------------|
|                              | (D1-2)     | (D1-2)     | (D1-2)     |           |          |            |           |                    |
| SAMPLE DATE                  | 88/08/10   | 88/08/10   | 88/08/10   | 88/11/17  | 89/03/07 | 89/05/31   |           |                    |
| BAS REF NO.                  | 8808064-04 | 8808064-05 | 8808064-06 | 8811092-8 | 880371-8 | 8906008-11 |           |                    |
| SAMPLING LEVEL               | 1          | 1          | 1          | 2+        | 2+       | 2+         |           |                    |
| pH                           | 12.15      | 12.15      | 12.15      | 12.28     | 12.65    | 12.26      | 12.2733   | 0.1769             |
| SPECIFIC CONDUCTANCE (µS/cm) | 1600       | 1600       | 1600       | 3190      | 1820     | 2760       | 2095.0000 | 639.2639           |
| TEMPERATURE (°C)             | NA         | NA         | NA         | 9         | 1        | 8          | 6.0000    | 3.5590             |
| DISSOLVED OXYGEN             | NA         | NA         | NA         | NA        | 3.7      | 1.6        | 2.6500    | 1.0500             |
| DIC                          | NA         | NA         | NA         | NA        | NA       | NA         | -         | -                  |
| ALKALINITY                   | NA         | NA         | NA         | 400       | 270      | 330        | 333.3333  | 53.1246            |
| SULPHIDE                     | NA         | NA         | NA         | NA        | NA       | NA         | -         | -                  |
| TOTAL CYANIDE                | NA         | NA         | NA         | <0.002    | <0.005   | <0.002     | 0.0000    | 0.0000             |
| BROMIDE                      | <1         | <1         | <1         | <1/<1     | <0.2     | <1         | 0.0000    | 0.0000             |
| CHLORIDE                     | 230        | 200        | 153        | 220/220   | 16.6     | 220        | 173.2667  | 74.4497            |
| FLUORIDE                     | 0.50       | 0.75       | 0.75       | 0.75/0.75 | 0.72     | 0.8        | 0.7117    | 0.0975             |
| SULPHATE                     | 115        | 98         | 86         | 160/162   | 24       | 114        | 99.6667   | 41.0636            |
| NITRATE-N                    | <0.5       | <0.5       | <0.5       | <0.2/<0.2 | 0.2      | <0.2       | 0.0333    | 0.0745             |
| AMMONIA-N                    | NA         | NA         | NA         | NA        | NA       | NA         | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA         | NA         | 1.13      | NA       | NA         | 1.1300    | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA         | NA         | 0.061     | NA       | NA         | 0.0610    | 0.0000             |
| DOC                          | 9.0        | 8.5/8.5    | 9.0        | NA        | NA       | 5.4        | 7.9750    | 1.5006             |
| PHENOLS                      | 0.007      | 0.008      | 0.008      | 0.005     | 0.003    | 0.005      | 0.0055    | 0.0028             |
| PCB (µg/L)                   | NA         | NA         | NA         | <0.02     | <0.02    | <0.02      | 0.0000    | 0.0000             |
| OIL AND GREASE               | 2          | 1          | 3          | NA        | NA       | NA         | 2.0000    | 0.8165             |
| ZINC                         | 0.01       | 0.01       | 0.02       | NA        | 0.02     | <0.01      | 0.0120    | 0.0075             |
| CADMIUM                      | 0.0014     | 0.0004     | 0.0006     | NA        | <0.005   | <0.005     | 0.0005    | 0.0005             |
| MANGANESE                    | 0.01       | <0.01      | 0.06       | NA        | <0.01    | <0.01      | 0.0140    | 0.0233             |
| COBALT                       | 0.02       | 0.02       | 0.02       | NA        | <0.01    | <0.01      | 0.0120    | 0.0098             |
| COPPER                       | 0.010      | <0.005     | <0.005     | NA        | <0.005   | 0.005      | 0.0030    | 0.0040             |
| IRON                         | <0.02      | <0.02      | 0.18       | NA        | 0.04     | 0.02/0.02  | 0.0480    | 0.0676             |
| LEAD                         | <0.05      | <0.05      | <0.05      | NA        | <0.05    | <0.05      | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.02       | 0.02       | 0.02       | NA        | 0.01     | 0.01/0.02  | 0.0170    | 0.0040             |
| NICKEL                       | 0.02       | 0.01       | 0.01       | NA        | <0.01    | 0.01       | 0.0100    | 0.0063             |
| BERYLLIUM                    | NA         | NA         | NA         | NA        | <0.01    | <0.01      | 0.0000    | 0.0000             |
| MOLYBDENUM                   | NA         | NA         | NA         | NA        | <0.02    | <0.02      | 0.0000    | 0.0000             |
| CALCIUM                      | NA         | NA         | NA         | 310       | 144      | 260        | 238.0000  | 69.5318            |
| VANADIUM                     | NA         | NA         | NA         | NA        | 0.03     | 0.04       | 0.0350    | 0.0050             |
| ALUMINUM                     | NA         | NA         | NA         | NA        | 0.28     | 0.28       | 0.2800    | 0.0000             |
| MAGNESIUM                    | NA         | NA         | NA         | 1.4       | 0.15     | 0.2        | 0.5833    | 0.5778             |
| BARIUM                       | NA         | NA         | NA         | NA        | 0.06     | 0.12       | 0.0900    | 0.0300             |
| POTASSIUM                    | NA         | NA         | NA         | 26        | 3.1      | 16.8       | 15.3000   | 9.4089             |
| STRONTIUM                    | NA         | NA         | NA         | NA        | 0.27     | 0.86       | 0.5650    | 0.2950             |
| SODIUM                       | NA         | NA         | NA         | 43        | 6.0      | 38         | 29.0000   | 16.3911            |
| ARSENIC (µg/L)               | NA         | NA         | NA         | NA        | NA       | NA         | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA         | NA         | NA        | NA       | NA         | -         | -                  |
| MERCURY (µg/L)               | NA         | NA         | NA         | NA        | NA       | NA         | -         | -                  |
| CATION EQUIVALENCE           | 0.00       | 0.00       | 0.01       | 18.12     | 7.57     | 15.10      |           |                    |
| ANION EQUIVALENCE            | 8.88       | 7.68       | 6.11       | 13.55     | 3.67     | 11.88      |           |                    |
| CHARGE BALANCE ERROR         | -100.00    | -100.00    | -99.79     | 14.41     | 34.72    | 11.97      |           |                    |
| BTX (µg/L)                   |            |            |            |           |          |            |           |                    |
| BENZENE                      | NA         | NA         | NA         | <2        | NA       | NA         | 0.0000    | 0.0000             |
| TOLUENE                      | NA         | NA         | NA         | <1        | NA       | NA         | 0.0000    | 0.0000             |
| XYLENE                       | NA         | NA         | NA         | <2        | NA       | NA         | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | -          | -          | 0         | -        | -          | 0.0000    | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | D1-2 | GWREP1 | GWREP2 | D1-2      | D1-2      | D1-2 | Average | Standard Deviation |
|-------------------------|------|--------|--------|-----------|-----------|------|---------|--------------------|
|                         |      |        |        |           |           |      |         |                    |
| PAHs (µg/L)             |      |        |        |           |           |      |         |                    |
| NAPHTHALENE             | NA   | NA     | NA     | 1.0/0.6   | <0.1/<0.1 | NA   | 0.4000  | 0.4000             |
| ACENAPHTHYLENE          | NA   | NA     | NA     | 0.2/0.2   | <0.1/<0.1 | NA   | 0.1000  | 0.1000             |
| ACENAPHTHENE            | NA   | NA     | NA     | 0.7/0.7   | 0.4/0.5   | NA   | 0.5750  | 0.1250             |
| FLUORENE                | NA   | NA     | NA     | 0.4/0.4   | 0.2/0.3   | NA   | 0.3250  | 0.0750             |
| PHENANTHRENE            | NA   | NA     | NA     | 1.6/1.5   | 0.5/1.0   | NA   | 1.1500  | 0.4000             |
| ANTHRACENE              | NA   | NA     | NA     | 0.2/0.2   | 0.1/0.2   | NA   | 0.1750  | 0.0250             |
| FLUORANTHENE            | NA   | NA     | NA     | 1.4/1.5   | 0.9/1.2   | NA   | 1.2500  | 0.2000             |
| PYRENE                  | NA   | NA     | NA     | 1.3/1.2   | 0.9/1.2   | NA   | 1.1500  | 0.1000             |
| BENZO(a)ANTHRACENE      | NA   | NA     | NA     | <0.1/<0.1 | <0.1/<0.1 | NA   | 0.0000  | 0.0000             |
| CHRYSENE                | NA   | NA     | NA     | 0.1/0.1   | 0.1/0.1   | NA   | 0.1000  | 0.0000             |
| BENZO(b)FLUORANTHENE    | NA   | NA     | NA     | <0.2/<0.2 | <0.2/<0.2 | NA   | 0.0000  | 0.0000             |
| BENZO(k)FLUORANTHENE    | NA   | NA     | NA     | <0.1/<0.1 | <0.1/<0.1 | NA   | 0.0000  | 0.0000             |
| BENZO(a)PYRENE          | NA   | NA     | NA     | <0.1/<0.1 | <0.1/<0.1 | NA   | 0.0000  | 0.0000             |
| PERYLENE                | NA   | NA     | NA     | <0.1/<0.1 | <0.1/<0.1 | NA   | 0.0000  | 0.0000             |
| INDENO(1,2,3-C,D)PYRENE | NA   | NA     | NA     | <0.1/<0.1 | <0.1/<0.1 | NA   | 0.0000  | 0.0000             |
| DIBENZO(a,h)ANTHRACENE  | NA   | NA     | NA     | <0.5/<0.5 | <0.5/<0.5 | NA   | 0.0000  | 0.0000             |
| BENZO(g,h,i)PERYLENE    | NA   | NA     | NA     | <0.5/<0.5 | <0.5/<0.5 | NA   | 0.0000  | 0.0000             |
| TOTAL PAHs              | -    | -      | -      | 6.9/6.4   | 3.1/4.5   | -    | 5.2250  | 1.4250             |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | D2         | D2        | D2       | D2        | GWREPI<br>(D2) | Average   | Standard<br>Deviation |
|------------------------------|------------|-----------|----------|-----------|----------------|-----------|-----------------------|
| SAMPLE DATE                  | 88/08/09   | 88/11/19  | 89/03/07 | 89/05/30  | 89/05/30       |           |                       |
| BAS REF NO.                  | 8808054-03 | 8811095-3 | 880371-6 | 8906008-7 | 8808064-5      |           |                       |
| SAMPLING LEVEL               | 1          | 1         | 2+       | 2+        |                |           |                       |
| pH                           | 11.83      | 12.31     | 12.39    | 12.06     | NA             | 12.1475   | 0.2200                |
| SPECIFIC CONDUCTANCE (µS/cm) | 1740       | 2480      | 2710     | 2280      | NA             | 2302.5000 | 358.6346              |
| TEMPERATURE (°C)             | 12         | 9         | 6        | 9         | NA             | 9.0000    | 2.1213                |
| DISSOLVED OXYGEN (ppm)       | 3          | NA        | 0.9      | 2.65      | NA             | 2.1833    | 0.9186                |
| DIC                          | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| ALKALINITY                   | NA         | 280       | 280      | 210       | NA             | 256.6667  | 32.9983               |
| SULPHIDE                     | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| TOTAL CYANIDE                | NA         | NA        | 0.28     | 0.038     | NA             | 0.1590    | 0.1210                |
| BROMIDE                      | <0.5       | <1        | <1       | <0.5      | NA             | 0.0000    | 0.0000                |
| CHLORIDE                     | 20         | 19        | 31       | 15.4      | NA             | 21.3500   | 5.8282                |
| FLUORIDE                     | 1.10       | 1.2       | 0.80     | 0.55      | NA             | 0.9125    | 0.2559                |
| SULPHATE                     | 320        | 430       | 370      | 440       | NA             | 390.0000  | 48.4768               |
| NITRATE-N                    | <0.2       | 0.2       | <0.2     | <0.1      | NA             | 0.0500    | 0.0866                |
| AMMONIA-N                    | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 2.3      | NA        | NA             | 2.3000    | 0.0000                |
| TOTAL PHOSPHOROUS            | NA         | NA        | 0.004    | NA        | NA             | 0.0040    | 0.0000                |
| DOC                          | 4.5        | 4.5       | NA       | 3.6       | NA             | 4.2000    | 0.4243                |
| PHENOLS                      | 0.010      | 0.005     | 0.005    | 0.005     | NA             | 0.0063    | 0.0022                |
| PCB (µg/L)                   | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| OIL AND GREASE               | 4          | NA        | NA       | NA        | NA             | 4.0000    | 0.0000                |
| ZINC                         | <0.01      | NA        | <0.01    | <0.01     | NA             | 0.0000    | 0.0000                |
| CADMIUM                      | 0.0010     | NA        | <0.005   | <0.005    | NA             | 0.0003    | 0.0005                |
| MANGANESE                    | <0.01      | NA        | <0.01    | <0.01     | NA             | 0.0000    | 0.0000                |
| COBALT                       | 0.02       | NA        | <0.01    | <0.01     | NA             | 0.0067    | 0.0094                |
| COPPER                       | <0.005     | NA        | 0.005    | 0.007     | NA             | 0.0040    | 0.0029                |
| IRON                         | <0.02      | NA        | 0.04     | 0.04/0.04 | NA             | 0.0267    | 0.0189                |
| LEAD                         | <0.05      | NA        | <0.05    | <0.05     | NA             | 0.0000    | 0.0000                |
| CHROMIUM                     | 0.02       | NA        | <0.01    | 0.02/0.02 | NA             | 0.0133    | 0.0094                |
| NICKEL                       | 0.01       | NA        | <0.01    | <0.01     | NA             | 0.0033    | 0.0047                |
| BERYLLIUM                    | NA         | NA        | <0.01    | <0.01     | NA             | 0.0000    | 0.0000                |
| MOLYBDENUM                   | NA         | NA        | 0.06     | 0.04/0.04 | NA             | 0.0500    | 0.0100                |
| CALCIUM                      | NA         | 230       | 200      | 210       | NA             | 213.3333  | 12.4722               |
| VANADIUM                     | NA         | NA        | 0.06     | 0.06/0.07 | NA             | 0.0625    | 0.0025                |
| ALUMINUM                     | NA         | NA        | 0.30     | 0.26/0.24 | NA             | 0.2750    | 0.0250                |
| MAGNESIUM                    | NA         | 1.05      | <0.05    | 0.2/0.25  | NA             | 0.4250    | 0.4514                |
| BARIUM                       | NA         | NA        | 0.10     | 0.1/0.1   | NA             | 0.1000    | 0.0000                |
| POTASSIUM                    | NA         | 103       | 98       | 84        | NA             | 95.0000   | 8.0416                |
| STRONTIUM                    | NA         | NA        | 1.19     | 1.12/1.14 | NA             | 1.1600    | 0.0300                |
| SODIUM                       | NA         | 40        | 47       | 35/36     | NA             | 40.8333   | 4.7317                |
| ARSENIC (µg/L)               | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| SELENIUM (µg/L)              | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| MERCURY (µg/L)               | NA         | NA        | NA       | NA        | NA             | -         | -                     |
| CATION EQUIVALENCE           | 0.00       | 15.94     | 14.57    | 14.22     | 0.00           |           |                       |
| ANION EQUIVALENCE            | 7.23       | 12.29     | 11.38    | 11.69     | 0.00           |           |                       |
| CHARGE BALANCE ERROR         | -100.00    | 12.92     | 12.30    | 9.75      | -              |           |                       |
| BTX (µg/L)                   |            |           |          |           |                |           |                       |
| BENZENE                      | NA         | NA        | 25       | NA        | NA             | 25.0000   | 0.0000                |
| TOLUENE                      | NA         | NA        | 21       | NA        | NA             | 21.0000   | 0.0000                |
| XYLENE                       | NA         | NA        | 19       | NA        | NA             | 19.0000   | 0.0000                |
| TOTAL BTX                    | -          | -         | 65       | -         | -              | 65.0000   | 0.0000                |

## Appendix 6: Groundwater

| PIEZOMETER              |    |    |      |      |        | Standard |           |
|-------------------------|----|----|------|------|--------|----------|-----------|
|                         | D2 | D2 | D2   | D2   | GWREP1 | Average  | Deviation |
| PAHs (µg/L)             |    |    |      |      |        |          |           |
| NAPHTHALENE             | NA | NA | 0.3  | 0.5  | <0.1   | 0.2667   | 0.2055    |
| ACENAPHTHYLENE          | NA | NA | 0.1  | 0.1  | <0.1   | 0.0667   | 0.0471    |
| ACENAPHTHENE            | NA | NA | 0.1  | 0.1  | <0.1   | 0.0667   | 0.0471    |
| FLUORENE                | NA | NA | 0.2  | 0.3  | 0.1    | 0.2000   | 0.0816    |
| PHENANTHRENE            | NA | NA | 0.3  | 1.3  | 0.1    | 0.5667   | 0.5249    |
| ANTHRACENE              | NA | NA | <0.1 | 0.2  | <0.1   | 0.0667   | 0.0943    |
| FLUORANTHENE            | NA | NA | 0.4  | 1.4  | 0.2    | 0.6667   | 0.5249    |
| PYRENE                  | NA | NA | 0.3  | 1.1  | 0.3    | 0.5667   | 0.3771    |
| BENZO(a)ANTHRACENE      | NA | NA | <0.1 | 0.6  | <0.2   | 0.2000   | 0.2828    |
| CHRYSENE                | NA | NA | <0.1 | 0.7  | <0.2   | 0.2333   | 0.3300    |
| BENZO(b)FLUORANTHENE    | NA | NA | <0.2 | 1.5  | <0.2   | 0.5000   | 0.7071    |
| BENZO(k)FLUORANTHENE    | NA | NA | <0.1 | <0.2 | <0.2   | 0.0000   | 0.0000    |
| BENZO(a)PYRENE          | NA | NA | <0.1 | 1.4  | <0.5   | 0.4667   | 0.6600    |
| PERYLENE                | NA | NA | <0.1 | <0.5 | <0.5   | 0.0000   | 0.0000    |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | <0.1 | <0.5 | <0.5   | 0.0000   | 0.0000    |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | <0.5 | <0.5 | <0.5   | 0.0000   | 0.0000    |
| BENZO(g,h,i)PERYLENE    | NA | NA | <0.5 | <0.5 | <0.5   | 0.0000   | 0.0000    |
| TOTAL PAHs              | -  | -  | 1.7  | 9.2  | 0.7    | 3.8667   | 3.7933    |

\* All Units are mg/L unless otherwise specified.  
NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | D3-1       |            |          |           | Average   | Standard Deviation |
|------------------------------|------------|------------|----------|-----------|-----------|--------------------|
|                              | D3-1       | D3-1       | D3-1     | D3-1      |           |                    |
| SAMPLE DATE                  | 88/08/10   | 88/11/19   | 89/03/10 | 89/05/31  |           |                    |
| BAS REF NO.                  | 8808064-07 | 8811095-12 | 890377-7 | 8906045-9 |           |                    |
| SAMPLING LEVEL               | 1          | 2+         | 2+       | 2         |           |                    |
| pH                           | 8.14       | 8.97       | 8.34     | 7.8       | 8.3125    | 0.4259             |
| SPECIFIC CONDUCTANCE (µS/cm) | 3020       | 4740       | 5950     | 5510      | 4805.0000 | 1117.8663          |
| TEMPERATURE (°C)             | 12         | 9          | 8        | 10        | 9.7500    | 1.4790             |
| DISSOLVED OXYGEN (ppm)       | 3.8        | NA         | 0.45     | 5         | 3.0833    | 1.9254             |
| DIC                          | NA         | NA         | NA       | NA        | -         | -                  |
| ALKALINITY                   | NA         | 12         | 10       | 12        | 11.3333   | 0.9428             |
| SULPHIDE                     | NA         | NA         | NA       | NA        | -         | -                  |
| TOTAL CYANIDE                | NA         | <0.002     | <0.005   | <0.002    | 0.0000    | 0.0000             |
| BROMIDE                      | <1         | 10.0/10.5  | 10       | 12/12     | 8.0625    | 4.7182             |
| CHLORIDE                     | 1280       | 1530       | 1500     | 1500      | 1452.5000 | 100.3432           |
| FLUORIDE                     | 1.5        | 1.5        | 1        | 1         | 1.2500    | 0.2500             |
| SULPHATE                     | 18/20      | 20         | 45       | 25        | 27.2500   | 10.4970            |
| NITRATE-N                    | 2.5/2.5    | <0.5       | <0.5     | <0.5      | 0.6250    | 1.0825             |
| AMMONIA-N                    | NA         | NA         | NA       | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | 0.32       | NA       | NA        | 0.3200    | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | 0.3        | NA       | NA        | 0.3000    | 0.0000             |
| DOC                          | <0.5       | NA         | NA       | 2.3       | 1.1500    | 1.1500             |
| PHENOLS                      | <0.001     | 0.001      | <0.001   | <0.001    | 0.0003    | 0.0004             |
| PCB (µg/L)                   | NA         | NA         | NA       | NA        | -         | -                  |
| OIL AND GREASE               | 2          | NA         | NA       | NA        | 2.0000    | 0.0000             |
| ZINC                         | 0.01/0.02  | NA         | 0.02     | 0.02      | 0.0183    | 0.0024             |
| CADMIUM                      | 0.0004     | NA         | <0.005   | <0.005    | 0.0001    | 0.0002             |
| MANGANESE                    | 0.20/0.20  | NA         | 0.08     | 0.08      | 0.1200    | 0.0566             |
| COBALT                       | 0.04/0.04  | NA         | 0.04     | 0.03      | 0.0367    | 0.0047             |
| COPPER                       | <0.005     | NA         | 0.005    | 0.01      | 0.0050    | 0.0041             |
| IRON                         | 0.26/0.26  | NA         | 0.34     | 0.62      | 0.4067    | 0.1543             |
| LEAD                         | <0.05      | NA         | <0.05    | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.02/0.02  | NA         | 0.03     | 0.03      | 0.0267    | 0.0047             |
| NICKEL                       | 0.04/0.04  | NA         | 0.02     | 0.02      | 0.0267    | 0.0094             |
| BERYLLIUM                    | NA         | NA         | <0.01    | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | NA         | NA         | 0.36     | 0.25      | 0.3050    | 0.0550             |
| CALCIUM                      | NA         | 420        | 460      | 400       | 426.6667  | 24.9444            |
| VANADIUM                     | NA         | NA         | 0.03     | <0.01     | 0.0150    | 0.0150             |
| ALUMINUM                     | NA         | NA         | 0.50     | 0.78      | 0.6400    | 0.1400             |
| MAGNESIUM                    | NA         | 41         | 42       | 45        | 42.6667   | 1.6997             |
| BARIUM                       | NA         | NA         | 0.33     | 0.33      | 0.3300    | 0.0000             |
| POTASSIUM                    | NA         | 29         | 31       | 26        | 28.6667   | 2.0548             |
| STRONTIUM                    | NA         | NA         | 10.7     | 9.8       | 10.2500   | 0.4500             |
| SODIUM                       | NA         | 290        | 290      | 290       | 290.0000  | 0.0000             |
| ARSENIC (µg/L)               | NA         | NA         | NA       | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA         | NA       | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA         | NA       | NA        | -         | -                  |
| CATION EQUIVALENCE           | 0.01       | 37.69      | 39.88    | 37.05     |           |                    |
| ANION EQUIVALENCE            | 36.54      | 43.70      | 43.35    | 42.95     |           |                    |
| CHARGE BALANCE ERROR         | -99.95     | -7.38      | -4.16    | -7.38     |           |                    |
| BTX (µg/L)                   |            |            |          |           |           |                    |
| BENZENE                      | NA         | <2         | NA       | NA        | 0.0000    | 0.0000             |
| TOLUENE                      | NA         | 11         | NA       | NA        | 11.0000   | 0.0000             |
| XYLENE                       | NA         | <2         | NA       | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | 11         | -        | -         | 11.0000   | 0.0000             |



## Appendix 6: Groundwater

| PIEZOMETER              | D3-1 | D3-1 | D3-1 | D3-1 | Standard |           |
|-------------------------|------|------|------|------|----------|-----------|
|                         |      |      |      |      | Average  | Deviation |
| PAHs (µg/L)             |      |      |      |      |          |           |
| NAPHTHALENE             | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| ACENAPHTHYLENE          | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| ACENAPHTHENE            | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| FLUORENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PHENANTHRENE            | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| ANTHRACENE              | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| FLUORANTHENE            | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PYRENE                  | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(a)ANTHRACENE      | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| CHRYSENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 | <0.2 | NA   | 0.0000   | 0.0000    |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(a)PYRENE          | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PERYLENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 | <0.5 | NA   | 0.0000   | 0.0000    |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 | <0.5 | NA   | 0.0000   | 0.0000    |
| TOTAL PAHs              | -    | 0    | 0    | -    | 0.0000   | 0.0000    |

\* All Units are mg/L, unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | D3-2       | D3-2       | D3-2     | D3-2      | Average   | Standard Deviation |
|------------------------------|------------|------------|----------|-----------|-----------|--------------------|
| SAMPLE DATE                  | 88/08/10   | 88/11/17   | 89/03/10 | 89/05/31  |           |                    |
| BAS REF NO.                  | 8808065-03 | 8811092-10 | 890377-9 | 8906046-2 |           |                    |
| SAMPLING LEVEL               | 2          | 3          | 3        | 3         |           |                    |
| pH                           | 11.58      | 11.71      | 11.92    | 11.42     | 11.6575   | 0.1831             |
| SPECIFIC CONDUCTANCE (µS/cm) | 900        | 1660       | 1750     | 1090      | 1350.0000 | 362.6982           |
| TEMPERATURE (°C)             | 13         | 9          | 7        | 8         | 9.2500    | 2.2776             |
| DISSOLVED OXYGEN             | 3.2        | NA         | 0        | 0         | 1.0667    | 1.5085             |
| DIC                          | 6          | NA         | 2.5      | 3.2       | 3.9000    | 1.5122             |
| ALKALINITY                   | 136        | 128        | 133      | 68        | 116.2500  | 28.0033            |
| SULPHIDE                     | 10.8       | NA         | 0.05     | <0.05     | 3.6167    | 5.0794             |
| TOTAL CYANIDE                | NA         | 1.38/1.41  | 2.6      | 1         | 1.6650    | 0.6805             |
| BROMIDE                      | <0.05      | <0.5       | <0.5     | <0.05     | 0.0000    | 0.0000             |
| CHLORIDE                     | 12.5/12.8  | 15.8       | 16.0     | 7.5       | 12.9875   | 3.4355             |
| FLUORIDE                     | 0.90/0.90  | 1          | 0.40     | 0.76      | 0.7650    | 0.2273             |
| SULPHATE                     | 280/280    | 430        | 390      | 270       | 342.5000  | 69.0561            |
| NITRATE-N                    | <0.10      | <0.1       | <0.1     | <0.01     | 0.0000    | 0.0000             |
| AMMONIA-N                    | NA         | 5.4/5.4    | 4.0      | 3         | 4.1333    | 0.9843             |
| TOTAL KJELDAHL NITROGEN      | 5.1        | NA         | 6.20     | 4.1       | 5.1333    | 0.8576             |
| TOTAL PHOSPHOROUS            | NA         | NA         | 0.014    | 0.023     | 0.0185    | 0.0045             |
| DOC                          | 7.0        | 12         | 12.9     | 6.2       | 9.5250    | 2.9558             |
| PHENOLS                      | 0.045      | 0.076      | 0.08     | 0.027     | 0.0570    | 0.0220             |
| PCB (µg/L)                   | NA         | <0.02      | <0.02    | <0.02     | 0.0000    | 0.0000             |
| OIL AND GREASE               | NA         | NA         | NA       | NA        | -         | -                  |
| ZINC                         | <0.01      | <0.01      | <0.01    | 0.01      | 0.0025    | 0.0043             |
| CADMIUM                      | 0.0012     | <0.005     | <0.005   | <0.005    | 0.0003    | 0.0005             |
| MANGANESE                    | <0.01      | <0.01      | <0.01    | <0.01     | 0.0000    | 0.0000             |
| COBALT                       | 0.01       | <0.01      | <0.01    | <0.01     | 0.0025    | 0.0043             |
| COPPER                       | <0.005     | <0.005     | <0.005   | <0.005    | 0.0000    | 0.0000             |
| IRON                         | 0.48       | 0.8        | 0.94     | 0.46      | 0.6700    | 0.2062             |
| LEAD                         | <0.05      | <0.05      | <0.05    | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.01       | <0.01      | <0.01    | <0.01     | 0.0025    | 0.0043             |
| NICKEL                       | <0.01      | <0.01      | <0.01    | <0.01     | 0.0000    | 0.0000             |
| BERYLLIUM                    | <0.01      | <0.01      | <0.01    | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | 0.02       | 0.04       | 0.04     | <0.02     | 0.0250    | 0.0166             |
| CALCIUM                      | 139        | 172        | 192      | 104       | 151.7500  | 33.4393            |
| VANADIUM                     | 0.05       | 0.04       | 0.03     | 0.04      | 0.0400    | 0.0071             |
| ALUMINUM                     | 0.80       | 0.72       | 0.66     | 0.34      | 0.6300    | 0.1746             |
| MAGNESIUM                    | 0.10       | 0.55       | 0.10     | 0.15      | 0.2250    | 0.1887             |
| BARIUM                       | 0.08       | 0.12       | 0.10     | 0.06      | 0.0900    | 0.0224             |
| POTASSIUM                    | 67         | 100        | 96       | 45        | 77.0000   | 22.4388            |
| STRONTIUM                    | 0.64       | 0.82       | 0.81     | 0.46      | 0.6825    | 0.1470             |
| SODIUM                       | 25         | 34         | 33       | 19.5      | 27.8750   | 5.9621             |
| ARSENIC (µg/L)               | NA         | 8/8        | 4        | 4         | 2.6667    | 1.8856             |
| SELENIUM (µg/L)              | NA         | 3/4        | 2        | <1        | 0.6667    | 0.9428             |
| MERCURY (µg/L)               | NA         | 0.15/<0.1  | <0.05    | 0.15      | 0.0525    | 0.0690             |
| CATION EQUIVALENCE           | 9.85       | 12.77      | 13.59    | 7.26      |           |                    |
| ANION EQUIVALENCE            | 7.55       | 10.68      | 9.90     | 6.51      |           |                    |
| CHARGE BALANCE ERROR         | 13.26      | 8.94       | 15.70    | 5.40      |           |                    |
| BTX (µg/L)                   |            |            |          |           |           |                    |
| BENZENE                      | NA         | 2          | <10      | <2/<2     | 0.6667    | 0.9428             |
| TOLUENE                      | NA         | <1         | <10      | <1/<1     | 0.0000    | 0.0000             |
| XYLENE                       | NA         | <2         | <10      | <2/<2     | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | 2          | 0        | 0         | 0.6667    | 0.9428             |

## Appendix 6: Groundwater

| PIEZOMETER              | D3-2  | D3-2 | D3-2      | D3-2 | Average | Standard<br>Deviation |
|-------------------------|-------|------|-----------|------|---------|-----------------------|
| PAHs (µg/L)             |       |      |           |      |         |                       |
| NAPHTHALENE             | 28    | 37   | 50/40     | 26   | 34.0000 | 7.5829                |
| ACENAPHTHYLENE          | 0.74  | 1.9  | 2.6/1.9   | 0.9  | 1.4725  | 0.6740                |
| ACENAPHTHENE            | 0.31  | 0.7  | 1.0/0.9   | 0.6  | 0.6400  | 0.2292                |
| FLUORENE                | 0.45  | 0.9  | 1.3/1.1   | 0.8  | 0.8375  | 0.2678                |
| PHENANTHRENE            | 1.34  | 1.5  | 3.0/1.8   | 1.4  | 1.7100  | 0.5170                |
| ANTHRACENE              | 0.22  | <0.1 | 7.0/0.3   | 0.3  | 1.0425  | 1.5094                |
| FLUORANTHENE            | 1.02  | 0.6  | 2.0/0.8   | 0.7  | 0.9800  | 0.3901                |
| PYRENE                  | 0.83  | 0.6  | 2.6/1.2   | 0.7  | 1.0075  | 0.5217                |
| BENZO(a)ANTHRACENE      | 0.13  | <0.1 | 0.5/0.3   | <0.2 | 0.1325  | 0.1633                |
| CHRYSENE                | 0.19  | <0.1 | 0.7/<0.1  | <0.2 | 0.1350  | 0.1464                |
| BENZO(b)FLUORANTHENE    | 0.1   | <0.2 | 0.7/<0.2  | <0.2 | 0.1125  | 0.1431                |
| BENZO(k)FLUORANTHENE    | <0.05 | <0.1 | 0.4/<0.1  | <0.2 | 0.0500  | 0.0866                |
| BENZO(a)PYRENE          | <0.05 | <0.1 | 0.8/<0.1  | <0.5 | 0.1000  | 0.1732                |
| PERYLENE                | <0.05 | <0.1 | <0.1/<0.1 | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1  | <0.1 | 0.5/<0.1  | <0.5 | 0.0625  | 0.1083                |
| DIBENZO(a,h)ANTHRACENE  | <0.2  | <0.5 | <0.5/<0.5 | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.1  | <0.5 | <0.5/<0.5 | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | 33.33 | 43.2 | 73.1/48.3 | 31.4 | 42.1575 | 11.6034               |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                                       | D4         | D4        | D4       | D4        | Average   | Standard Deviation |
|--------------------------------------------------|------------|-----------|----------|-----------|-----------|--------------------|
| SAMPLE DATE                                      | 88/08/09   | 88/11/19  | 89/03/10 | 89/05/30  |           |                    |
| BAS REF NO.                                      | 8808054-04 | 8811095-2 | 890378-4 | 8906008-8 |           |                    |
| SAMPLING LEVEL                                   | 1          | 1         | 2+       | 2+        |           |                    |
| pH                                               | 12.25      | 12.59     | 12.92    | 12.5      | 12.5650   | 0.2398             |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 4000       | 5560      | 7950     | 6020      | 5882.5000 | 1409.0134          |
| TEMPERATURE ( $^{\circ}\text{C}$ )               | 12         | 9         | 7        | 8         | 9.0000    | 1.8708             |
| DISSOLVED OXYGEN                                 | 2          | NA        | 0        | 0         | 0.6667    | 0.9428             |
| DIC                                              | NA         | NA        | NA       | NA        | -         | -                  |
| ALKALINITY                                       | NA         | 650       | 690      | 670       | 670.0000  | 16.3299            |
| SULPHIDE                                         | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL CYANIDE                                    | NA         | NA        | 0.065    | <0.002    | 0.0325    | 0.0325             |
| BROMIDE                                          | <2         | <1        | <5       | <1        | 0.0000    | 0.0000             |
| CHLORIDE                                         | 28         | 59        | 71       | 55        | 53.2500   | 15.7222            |
| FLUORIDE                                         | 0.50       | <0.5      | <1       | 1         | 0.3750    | 0.4146             |
| SULPHATE                                         | 500        | 1100      | 1300     | 1190      | 1022.5000 | 309.8689           |
| NITRATE-N                                        | <1.0       | <0.2      | <1       | <0.2      | 0.0000    | 0.0000             |
| AMMONIA-N                                        | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN                          | NA         | NA        | 1.43     | NA        | 1.4300    | 0.0000             |
| TOTAL PHOSPHOROUS                                | NA         | NA        | 0.001    | NA        | 0.0010    | 0.0000             |
| DOC                                              | 5.5        | 7.5       | NA       | 5.8       | 6.2667    | 0.8807             |
| PHENOLS                                          | 0.021      | 0.009     | 0.013    | 0.011     | 0.0135    | 0.0046             |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA         | NA        | NA       | NA        | -         | -                  |
| OIL AND GREASE                                   | 5          | NA        | NA       | NA        | 5.0000    | 0.0000             |
| ZINC                                             | 0.01       | NA        | <0.01    | <0.01     | 0.0033    | 0.0047             |
| CADMIUM                                          | 0.012      | NA        | <0.005   | <0.005    | 0.0040    | 0.0057             |
| MANGANESE                                        | <0.01      | NA        | <0.01    | <0.01     | 0.0000    | 0.0000             |
| COBALT                                           | 0.03       | NA        | 0.01     | <0.01     | 0.0133    | 0.0125             |
| COPPER                                           | <0.005     | NA        | <0.005   | 0.005     | 0.0017    | 0.0024             |
| IRON                                             | <0.02      | NA        | 0.02     | 0.04/0.04 | 0.0200    | 0.0163             |
| LEAD                                             | <0.05      | NA        | <0.05    | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                                         | 0.03       | NA        | 0.02     | 0.03/0.03 | 0.0267    | 0.0047             |
| NICKEL                                           | 0.02       | NA        | <0.01    | 0.02/0.01 | 0.0117    | 0.0085             |
| BERYLLIUM                                        | NA         | NA        | <0.01    | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                                       | NA         | NA        | 0.04     | 0.02      | 0.0300    | 0.0100             |
| CALCIUM                                          | NA         | 540       | 620      | 500       | 553.3333  | 49.8888            |
| VANADIUM                                         | NA         | NA        | 0.05     | 0.05      | 0.0500    | 0.0000             |
| ALUMINUM                                         | NA         | NA        | 0.46     | 0.34      | 0.4000    | 0.0600             |
| MAGNESIUM                                        | NA         | 2.4       | 0.15     | 0.15      | 0.9000    | 1.0607             |
| BARIUM                                           | NA         | NA        | 0.08     | 0.08      | 0.0800    | 0.0000             |
| POTASSIUM                                        | NA         | 350       | 480      | 350       | 393.3333  | 61.2826            |
| STRONTIUM                                        | NA         | NA        | 1.76     | 1.5       | 1.6300    | 0.1300             |
| SODIUM                                           | NA         | 100       | 135      | 105       | 113.3333  | 15.4560            |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA        | -         | -                  |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA         | NA        | NA       | NA        | -         | -                  |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA         | NA        | NA       | NA        | -         | -                  |
| CATION EQUIVALENCE                               | 0.00       | 40.44     | 49.15    | 38.52     |           |                    |
| ANION EQUIVALENCE                                | 11.20      | 31.06     | 35.96    | 33.02     |           |                    |
| CHARGE BALANCE ERROR                             | -100.00    | 13.12     | 15.49    | 7.69      |           |                    |
| BTX ( $\mu\text{g}/\text{L}$ )                   |            |           |          |           |           |                    |
| BENZENE                                          | NA         | NA        | <10      | NA        | 0.0000    | 0.0000             |
| TOLUENE                                          | NA         | NA        | <10      | NA        | 0.0000    | 0.0000             |
| XYLENE                                           | NA         | NA        | <10      | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                                        | -          | -         | 0        | -         | 0.0000    | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | D4 | D4 | D4   | D4   | Average | Standard Deviation |
|-------------------------|----|----|------|------|---------|--------------------|
|                         |    |    |      |      |         |                    |
| PAHs (µg/L)             |    |    |      |      |         |                    |
| NAPHTHALENE             | NA | NA | 4.8  | 4.8  | 4.8000  | 0.0000             |
| ACENAPHTHYLENE          | NA | NA | 0.1  | 0.2  | 0.1500  | 0.0500             |
| ACENAPHTHENE            | NA | NA | 2.6  | 2.9  | 2.7500  | 0.1500             |
| FLUORENE                | NA | NA | 1.2  | 1.4  | 1.3000  | 0.1000             |
| PHENANTHRENE            | NA | NA | 2.5  | 3.4  | 2.9500  | 0.4500             |
| ANTHRACENE              | NA | NA | 0.4  | 0.4  | 0.4000  | 0.0000             |
| FLUORANTHENE            | NA | NA | 1.3  | 1.4  | 1.3500  | 0.0500             |
| PYRENE                  | NA | NA | 1    | 1.2  | 1.1000  | 0.1000             |
| BENZO(a)ANTHRACENE      | NA | NA | <0.1 | 0.2  | 0.1000  | 0.1000             |
| CHRYSENE                | NA | NA | <0.1 | 0.4  | 0.2000  | 0.2000             |
| BENZO(b)FLUORANTHENE    | NA | NA | <0.2 | <0.2 | 0.0000  | 0.0000             |
| BENZO(k)FLUORANTHENE    | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000             |
| BENZO(a)PYRENE          | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000             |
| PERYLENE                | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000             |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000             |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000             |
| BENZO(g,h,i)PERYLENE    | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000             |
| TOTAL PAHs              | -  | -  | 13.9 | 16.3 | 15.1000 | 1.2000             |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                                       | D5-1       | D5-1       | D5-1      | D5-1      | Average   | Standard Deviation |
|--------------------------------------------------|------------|------------|-----------|-----------|-----------|--------------------|
| SAMPLE DATE                                      | 88/08/09   | 88/11/19   | 89/03/10  | 89/05/31  |           |                    |
| BAS REF NO.                                      | 8808054-05 | 8811095-10 | 890378-1  | 8906045-7 |           |                    |
| SAMPLING LEVEL                                   | 1          | 2+         | 2+        | 2         |           |                    |
| pH                                               | 7.37       | 7.22       | 7.49      | 7.36      | 7.3600    | 0.0957             |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 1320       | 2000       | 2590      | 2560      | 2117.5000 | 516.9321           |
| TEMPERATURE ( $^{\circ}\text{C}$ )               | 12.5       | 9          | 5         | 8         | 8.6250    | 2.6780             |
| DISSOLVED OXYGEN                                 | 3.2        | NA         | 4.9       | 0         | 2.7000    | 2.0314             |
| DIC                                              | NA         | NA         | NA        | NA        | -         | -                  |
| ALKALINITY                                       | NA         | 100        | 84        | 59        | 81.0000   | 16.8721            |
| SULPHIDE                                         | NA         | NA         | NA        | NA        | -         | -                  |
| TOTAL CYANIDE                                    | NA         | <0.002     | 0.93/0.92 | 0.008     | 0.3110    | 0.4342             |
| BROMIDE                                          | <0.5       | 1          | 6         | <0.5      | 1.7500    | 2.4875             |
| CHLORIDE                                         | 160        | 175        | 1570*     | 136       | 157.0000  | 16.0624            |
| FLUORIDE                                         | 1.40       | 1.4        | 2.0       | 0.2       | 1.2500    | 0.6538             |
| SULPHATE                                         | 470        | 610        | 7100*     | 970       | 683.3333  | 210.6076           |
| NITRATE-N                                        | <0.2       | <0.1       | <1        | 0.1       | 0.0250    | 0.0433             |
| AMMONIA-N                                        | NA         | NA         | NA        | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN                          | NA         | 1.05       | NA        | NA        | 1.0500    | 0.0000             |
| TOTAL PHOSPHOROUS                                | NA         | 2.3        | NA        | NA        | 2.3000    | 0.0000             |
| DOC                                              | 4.0        | NA         | NA        | 4.8       | 4.4000    | 0.4000             |
| PHENOLS                                          | 0.003      | 0.004      | 0.006     | 0.004     | 0.0043    | 0.0011             |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA         | NA         | NA        | NA        | -         | -                  |
| OIL AND GREASE                                   | 3          | NA         | NA        | NA        | 3.0000    | 0.0000             |
| ZINC                                             | 0.04       | NA         | 0.01      | 0.01      | 0.0200    | 0.0141             |
| CADMIUM                                          | 0.0012     | NA         | <0.005    | <0.005    | 0.0004    | 0.0006             |
| MANGANESE                                        | 1.24       | NA         | 2.2       | 2.8       | 2.0800    | 0.6425             |
| COBALT                                           | 0.02       | NA         | <0.01     | 0.01      | 0.0100    | 0.0082             |
| COPPER                                           | 0.005      | NA         | <0.005    | 0.01      | 0.0050    | 0.0041             |
| IRON                                             | 43         | NA         | 39        | 63        | 48.3333   | 10.4987            |
| LEAD                                             | <0.05      | NA         | <0.05     | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                                         | 0.02       | NA         | <0.01     | 0.01      | 0.0100    | 0.0082             |
| NICKEL                                           | 0.01       | NA         | <0.01     | <0.01     | 0.0033    | 0.0047             |
| BERYLLIUM                                        | NA         | NA         | <0.01     | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                                       | NA         | NA         | 0.06      | 0.1       | 0.0800    | 0.0200             |
| CALCIUM                                          | NA         | 189        | 240       | 240       | 223.0000  | 24.0416            |
| VANADIUM                                         | NA         | NA         | 0.02      | 0.01      | 0.0150    | 0.0050             |
| ALUMINUM                                         | NA         | NA         | 0.22      | 0.32      | 0.2700    | 0.0500             |
| MAGNESIUM                                        | NA         | 25         | 28        | 35        | 29.3333   | 4.1899             |
| BARIUM                                           | NA         | NA         | 0.15      | 0.13      | 0.1400    | 0.0100             |
| POTASSIUM                                        | NA         | 10.4       | 12.8      | 12.5      | 11.9000   | 1.0677             |
| STRONTIUM                                        | NA         | NA         | 3.6       | 4.1       | 3.8500    | 0.2500             |
| SODIUM                                           | NA         | 73         | 195       | 180       | 149.3333  | 54.3221            |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA         | NA         | NA        | NA        | -         | -                  |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA         | NA         | NA        | NA        | -         | -                  |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA         | NA         | NA        | NA        | -         | -                  |
| CATION EQUIVALENCE                               | 1.54       | 14.93      | 24.51     | 25.30     |           |                    |
| ANION EQUIVALENCE                                | 14.30      | 18.64      | 192.95    | 24.62     |           |                    |
| CHARGE BALANCE ERROR                             | -80.56     | -11.04     | -77.46    | 1.35      |           |                    |
| BTX ( $\mu\text{g}/\text{L}$ )                   |            |            |           |           |           |                    |
| BENZENE                                          | NA         | 15         | NA        | NA        | 15.0000   | 0.0000             |
| TOLUENE                                          | NA         | 17         | NA        | NA        | 17.0000   | 0.0000             |
| XYLENE                                           | NA         | <2         | NA        | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                                        | -          | 32         | -         | -         | 32.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | D5-1 | D5-1 | D5-1 | D5-1 | Standard |           |
|-------------------------|------|------|------|------|----------|-----------|
|                         |      |      |      |      | Average  | Deviation |
| PAHs (µg/L)             |      |      |      |      |          |           |
| NAPHTHALENE             | NA   | <0.1 | 0.2  | NA   | 0.1000   | 0.1000    |
| ACENAPHTHYLENE          | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| ACENAPHTHENE            | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| FLUORENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PHENANTHRENE            | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| ANTHRACENE              | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| FLUORANTHENE            | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PYRENE                  | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(a)ANTHRACENE      | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| CHRYSENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 | <0.2 | NA   | 0.0000   | 0.0000    |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(a)PYRENE          | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PERYLENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 | <0.5 | NA   | 0.0000   | 0.0000    |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 | <0.5 | NA   | 0.0000   | 0.0000    |
| TOTAL PAHs              | -    | 0    | 0.2  | -    | 0.1000   | 0.1000    |

All Units are mg/L unless otherwise specified.

NA: Not Analyzed

\* Anomalous Values assumed to be laboratory errors. Values are not included in calculation of statistics.

## Appendix 6: Groundwater

| PIEZOMETER                                       | D5-2       |            |           |           | Standard  |           |
|--------------------------------------------------|------------|------------|-----------|-----------|-----------|-----------|
|                                                  | Average    | Deviation  |           |           |           |           |
| SAMPLE DATE                                      | 88/08/09   | 88/11/19   | 89/03/10  | 89/05/31  |           |           |
| BAS REF NO.                                      | 8808054-06 | 8811095-11 | 890378-2  | 8906045-8 |           |           |
| SAMPLING LEVEL                                   | 1          | 2+         | 2+        | 2         |           |           |
| pH                                               | 9.20       | 8.46       | 7.27      | 6.99      | 7.9800    | 0.8948    |
| SPECIFIC CONDUCTANCE ( $\mu\text{S}/\text{cm}$ ) | 3260       | 5910       | 7650      | 7030      | 5962.5000 | 1680.2883 |
| TEMPERATURE ( $^{\circ}\text{C}$ )               | 11         | 8          | 6         | 10        | 8.7500    | 1.9203    |
| DISSOLVED OXYGEN                                 | 7.4        | NA         | 0         | 4.2       | 3.8667    | 3.0302    |
| DIC                                              | NA         | NA         | NA        | NA        | -         | -         |
| ALKALINITY                                       | NA         | 113        | 177       | 115       | 135.0000  | 29.7097   |
| SULPHIDE                                         | NA         | NA         | NA        | NA        | -         | -         |
| TOTAL CYANIDE                                    | NA         | 0.045      | 0.35      | 0.04/0.04 | 0.1450    | 0.1450    |
| BROMIDE                                          | <2         | <2         | <5/<5     | <0.5      | 0.0000    | 0.0000    |
| CHLORIDE                                         | 36         | 50         | 51/46     | 28        | 40.6250   | 9.0924    |
| FLUORIDE                                         | 2.5        | 1.5        | 1.0/2.0   | 3.2       | 2.1750    | 0.7189    |
| SULPHATE                                         | 2300       | 3200       | 3300/3300 | 3500      | 3075.0000 | 460.2988  |
| NITRATE-N                                        | <1         | <0.5       | 1/<1      | <0.1      | 0.1250    | 0.2165    |
| AMMONIA-N                                        | NA         | NA         | NA        | NA        | -         | -         |
| TOTAL KJELDAHL NITROGEN                          | NA         | 28         | NA        | NA        | 28.0000   | 0.0000    |
| TOTAL PHOSPHOROUS                                | NA         | 1.37       | NA        | NA        | 1.3700    | 0.0000    |
| DOC                                              | 26         | NA         | NA        | 28        | 27.0000   | 1.0000    |
| PHENOLS                                          | 0.021      | 0.008      | 0.005     | 0.003     | 0.0093    | 0.0070    |
| PCB ( $\mu\text{g}/\text{L}$ )                   | NA         | NA         | NA        | NA        | -         | -         |
| OIL AND GREASE                                   | 5          | NA         | NA        | NA        | 5.0000    | 0.0000    |
| ZINC                                             | 0.02       | NA         | 0.02      | 0.03      | 0.0233    | 0.0047    |
| CADMIUM                                          | 0.0002     | NA         | <0.005    | <0.005    | 0.0001    | 0.0001    |
| MANGANESE                                        | 0.20       | NA         | 5.2       | 3         | 2.8000    | 2.0461    |
| COBALT                                           | 0.03       | NA         | 0.03      | 0.03      | 0.0300    | 0.0000    |
| COPPER                                           | 0.005      | NA         | 0.01      | 0.015     | 0.0100    | 0.0041    |
| IRON                                             | 0.04       | NA         | 132       | 28        | 53.3467   | 56.7756   |
| LEAD                                             | <0.05      | NA         | <0.05     | <0.05     | 0.0000    | 0.0000    |
| CHROMIUM                                         | 0.04       | NA         | 0.03      | 0.04      | 0.0367    | 0.0047    |
| NICKEL                                           | 0.02       | NA         | 0.010     | 0.02      | 0.0167    | 0.0047    |
| BERYLLIUM                                        | NA         | NA         | <0.01     | <0.01     | 0.0000    | 0.0000    |
| MOLYBDENUM                                       | NA         | NA         | 0.08      | 0.07      | 0.0750    | 0.0050    |
| CALCIUM                                          | NA         | 210        | 760       | 560       | 510.0000  | 227.3030  |
| VANADIUM                                         | NA         | NA         | 0.04      | <0.01     | 0.0200    | 0.0200    |
| ALUMINUM                                         | NA         | NA         | 0.56      | 0.7       | 0.6300    | 0.0700    |
| MAGNESIUM                                        | NA         | 31         | 65        | 66        | 54.0000   | 16.2686   |
| BARIUM                                           | NA         | NA         | 0.11      | 0.09      | 0.1000    | 0.0100    |
| POTASSIUM                                        | NA         | 820        | 680       | 780       | 760.0000  | 58.8784   |
| STRONTIUM                                        | NA         | NA         | 3.3       | 2.8       | 3.0500    | 0.2500    |
| SODIUM                                           | NA         | 240        | 280       | 260       | 260.0000  | 16.3299   |
| ARSENIC ( $\mu\text{g}/\text{L}$ )               | NA         | NA         | NA        | NA        | -         | -         |
| SELENIUM ( $\mu\text{g}/\text{L}$ )              | NA         | NA         | NA        | NA        | -         | -         |
| MERCURY ( $\mu\text{g}/\text{L}$ )               | NA         | NA         | NA        | NA        | -         | -         |
| CATION EQUIVALENCE                               | 0.00       | 44.44      | 77.63     | 65.71     |           |           |
| ANION EQUIVALENCE                                | 48.90      | 69.16      | 71.84     | 74.81     |           |           |
| CHARGE BALANCE ERROR                             | -99.99     | -21.76     | 3.87      | -6.47     |           |           |
| BTX ( $\mu\text{g}/\text{L}$ )                   |            |            |           |           |           |           |
| BENZENE                                          | NA         | 3          | NA        | NA        | 3.0000    | 0.0000    |
| TOLUENE                                          | NA         | 9          | NA        | NA        | 9.0000    | 0.0000    |
| XYLENE                                           | NA         | <2         | NA        | NA        | 0.0000    | 0.0000    |
| TOTAL BTX                                        | -          | 12         | -         | -         | 12.0000   | 0.0000    |



## Appendix 6: Groundwater

| PIEZOMETER              | D5-2 | D5-2 | D5-2 | D5-2 | Standard |           |
|-------------------------|------|------|------|------|----------|-----------|
|                         |      |      |      |      | Average  | Deviation |
| PAHs (µg/L)             |      |      |      |      |          |           |
| NAPHTHALENE             | NA   | 2.3  | 0.6  | NA   | 1.4500   | 0.8500    |
| ACENAPHTHYLENE          | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| ACENAPHTHENE            | NA   | 2.1  | 0.7  | NA   | 1.4000   | 0.7000    |
| FLUORENE                | NA   | 1.3  | 0.4  | NA   | 0.8500   | 0.4500    |
| PHENANTHRENE            | NA   | 1.8  | 0.7  | NA   | 1.2500   | 0.5500    |
| ANTHRACENE              | NA   | 0.3  | 0.1  | NA   | 0.2000   | 0.1000    |
| FLUORANTHENE            | NA   | 0.3  | 0.1  | NA   | 0.2000   | 0.1000    |
| PYRENE                  | NA   | 0.2  | <0.1 | NA   | 0.1000   | 0.1000    |
| BENZO(a)ANTHRACENE      | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| CHRYSENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(b)FLUORANTHENE    | NA   | <0.2 | <0.2 | NA   | 0.0000   | 0.0000    |
| BENZO(k)FLUORANTHENE    | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| BENZO(a)PYRENE          | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| PERYLENE                | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| INDENO(1,2,3-C,D)PYRENE | NA   | <0.1 | <0.1 | NA   | 0.0000   | 0.0000    |
| DIBENZO(a,h)ANTHRACENE  | NA   | <0.5 | <0.5 | NA   | 0.0000   | 0.0000    |
| BENZO(g,h,i)PERYLENE    | NA   | <0.5 | <0.5 | NA   | 0.0000   | 0.0000    |
| TOTAL PAHs              | -    | 8.3  | 2.6  | -    | 5.4500   | 2.8500    |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | D6         | D6        | D6       | D6        | Average   | Standard Deviation |
|------------------------------|------------|-----------|----------|-----------|-----------|--------------------|
| SAMPLE DATE                  | 88/08/09   | 88/11/17  | 89/03/10 | 89/05/30  |           |                    |
| BAS REF NO.                  | 8808054-07 | 8811092-3 | 890378-5 | 8906008-9 |           |                    |
| SAMPLING LEVEL               | 1          | 1         | 2+       | 2+        |           |                    |
| pH                           | 7.27       | 7.23      | 7.15     | 7.13      | 7.1950    | 0.0572             |
| SPECIFIC CONDUCTANCE (µS/cm) | 2530       | 3030      | 3170     | 3000      | 2932.5000 | 241.0783           |
| TEMPERATURE (°C)             | 13         | 8         | 7        | 11        | 9.7500    | 2.3848             |
| DISSOLVED OXYGEN             | 9          | NA        | 0.5      | 1.2       | 3.5667    | 3.8526             |
| DIC                          | NA         | NA        | NA       | NA        | -         | -                  |
| ALKALINITY                   | NA         | 760       | 640/630  | 640       | 678.3333  | 57.7831            |
| SULPHIDE                     | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL CYANIDE                | NA         | NA        | 0.11     | 0.102     | 0.1060    | 0.0040             |
| BROMIDE                      | <2         | <1        | <1       | <1        | 0.0000    | 0.0000             |
| CHLORIDE                     | 180        | 180       | 150      | 134       | 161.0000  | 19.8242            |
| FLUORIDE                     | 1.0        | 2.8       | 1.40     | 0.6       | 1.4500    | 0.8292             |
| SULPHATE                     | 450        | 460       | 103      | 650       | 415.7500  | 197.3682           |
| NITRATE-N                    | <0.5       | <0.2      | <0.2     | <0.2      | 0.0000    | 0.0000             |
| AMMONIA-N                    | NA         | NA        | NA       | NA        | -         | -                  |
| TOTAL KJELDAHL NITROGEN      | NA         | NA        | 2.5      | NA        | 2.5000    | 0.0000             |
| TOTAL PHOSPHOROUS            | NA         | NA        | 0.011    | NA        | 0.0110    | 0.0000             |
| DOC                          | 24         | 32        | NA       | 23        | 26.3333   | 4.0277             |
| PHENOLS                      | <0.001     | 0.008     | 0.002    | <0.001    | 0.0025    | 0.0033             |
| PCB (µg/L)                   | NA         | NA        | NA       | NA        | -         | -                  |
| OIL AND GREASE               | 7          | NA        | NA       | NA        | 7.0000    | 0.0000             |
| ZINC                         | 0.04       | NA        | 0.02     | 0.02/0.02 | 0.0267    | 0.0094             |
| CADMIUM                      | 0.0010     | NA        | <0.005   | <0.005    | 0.0003    | 0.0005             |
| MANGANESE                    | 1.64       | NA        | 1.99     | 2.2/2.1   | 1.9267    | 0.2130             |
| COBALT                       | 0.02       | NA        | <0.01    | <0.01     | 0.0067    | 0.0094             |
| COPPER                       | 0.010      | NA        | <0.005   | 0.005     | 0.0050    | 0.0041             |
| IRON                         | 6.1        | NA        | 35       | 32        | 24.3667   | 12.9744            |
| LEAD                         | <0.05      | NA        | <0.05    | <0.05     | 0.0000    | 0.0000             |
| CHROMIUM                     | 0.02       | NA        | <0.01    | 0.03/0.02 | 0.0150    | 0.0108             |
| NICKEL                       | 0.02       | NA        | <0.01    | 0.02/0.02 | 0.0133    | 0.0094             |
| BERYLLIUM                    | NA         | NA        | <0.01    | <0.01     | 0.0000    | 0.0000             |
| MOLYBDENUM                   | NA         | NA        | 0.02     | <0.02     | 0.0100    | 0.0100             |
| CALCIUM                      | NA         | 280       | 360      | 330       | 323.3333  | 32.9983            |
| VANADIUM                     | NA         | NA        | 0.05     | 0.04      | 0.0450    | 0.0050             |
| ALUMINUM                     | NA         | NA        | 0.32     | 0.3       | 0.3100    | 0.0100             |
| MAGNESIUM                    | NA         | 100       | 102      | 117       | 106.3333  | 7.5865             |
| BARIUM                       | NA         | NA        | 0.08     | 0.07      | 0.0750    | 0.0050             |
| POTASSIUM                    | NA         | 21        | 24       | 23        | 22.6667   | 1.2472             |
| STRONTIUM                    | NA         | NA        | 0.79     | 0.72      | 0.7550    | 0.0350             |
| SODIUM                       | NA         | 84        | 168      | 102       | 118.0000  | 36.1109            |
| ARSENIC (µg/L)               | NA         | NA        | NA       | NA        | -         | -                  |
| SELENIUM (µg/L)              | NA         | NA        | NA       | NA        | -         | -                  |
| MERCURY (µg/L)               | NA         | NA        | NA       | NA        | -         | -                  |
| CATION EQUIVALENCE           | 0.22       | 26.39     | 35.57    | 32.30     |           |                    |
| ANION EQUIVALENCE            | 14.45      | 22.25     | 12.72    | 23.71     |           |                    |
| CHARGE BALANCE ERROR         | -97.02     | 8.52      | 47.31    | 15.34     |           |                    |
| BTX (µg/L)                   |            |           |          |           |           |                    |
| BENZENE                      | NA         | NA        | 62       | NA        | 62.0000   | 0.0000             |
| TOLUENE                      | NA         | NA        | <30      | NA        | 0.0000    | 0.0000             |
| XYLENE                       | NA         | NA        | <40      | NA        | 0.0000    | 0.0000             |
| TOTAL BTX                    | -          | -         | 62       | -         | 62.0000   | 0.0000             |

## Appendix 6: Groundwater

| PIEZOMETER              | D6 | D6 | D6   | D6   | Average | Standard<br>Deviation |
|-------------------------|----|----|------|------|---------|-----------------------|
| PAHs (µg/L)             |    |    |      |      |         |                       |
| NAPHTHALENE             | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| ACENAPHTHYLENE          | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| ACENAPHTHENE            | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| FLUORENE                | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PHENANTHRENE            | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| ANTHRACENE              | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| FLUORANTHENE            | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PYRENE                  | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| CHRYSENE                | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | NA | NA | <0.2 | <0.2 | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | NA | NA | <0.1 | <0.2 | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| PERYLENE                | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | NA | NA | <0.1 | <0.5 | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | NA | NA | <0.5 | <0.5 | 0.0000  | 0.0000                |
| TOTAL PAHs              | -  | -  | 0    | 0    | 0.0000  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

## Appendix 6: Groundwater

| PIEZOMETER                   | TRIP<br>BLANK | TRIP<br>BLANK | TRIP<br>BLANK | TRIP<br>BLANK | Average | Standard<br>Deviation |
|------------------------------|---------------|---------------|---------------|---------------|---------|-----------------------|
| SAMPLE DATE                  | 88/08/10      | 88/11/17      | 89/03/10      | 89/05/30      |         |                       |
| BAS REF NO.                  | 8808065       | 8811120-13    | 890378-3      | 8906036-3     |         |                       |
| SAMPLING LEVEL               |               | 8811095-7     |               |               |         |                       |
| pH                           | NA            | NA            | NA            | NA            | -       | -                     |
| SPECIFIC CONDUCTANCE (µS/cm) | NA            | NA            | NA            | NA            | -       | -                     |
| TEMPERATURE (°C)             | NA            | NA            | NA            | NA            | -       | -                     |
| DISSOLVED OXYGEN (ppm)       | NA            | NA            | NA            | NA            | -       | -                     |
| DIC                          | 1             | NA            | NA            | NA            | 1.0000  | 0.0000                |
| ALKALINITY                   | 2             | 2             | NA            | NA            | 2.0000  | 0.0000                |
| SULPHIDE                     | <0.05         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| TOTAL CYANIDE                | <0.002        | NA            | <0.005        | NA            | 0.0000  | 0.0000                |
| BROMIDE                      | <0.05         | <0.05         | NA            | NA            | 0.0000  | 0.0000                |
| CHLORIDE                     | <0.02         | <0.01         | NA            | NA            | 0.0000  | 0.0000                |
| FLUORIDE                     | <0.01         | <0.01         | NA            | NA            | 0.0000  | 0.0000                |
| SULPHATE                     | <0.1          | <0.2          | NA            | NA            | 0.0000  | 0.0000                |
| NITRATE-N                    | <0.01         | <0.01         | NA            | NA            | 0.0000  | 0.0000                |
| AMMONIA-N                    | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| TOTAL KJELDAHL NITROGEN      | <0.05         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| TOTAL PHOSPHOROUS            | <0.001        | NA            | NA            | NA            | 0.0000  | 0.0000                |
| DOC                          | <0.5          | NA            | NA            | NA            | 0.0000  | 0.0000                |
| PHENOLS                      | 0.003         | <0.001        | 0.001         | NA            | 0.0020  | 0.0010                |
| PCB (µg/L)                   | <0.1          | NA            | <0.02         | NA            | 0.0000  | 0.0000                |
| OIL AND GREASE               | 2             | NA            | NA            | NA            | 2.0000  | 0.0000                |
| ZINC                         | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| CADMIUM                      | 0.0004        | NA            | NA            | NA            | 0.0004  | 0.0000                |
| MANGANESE                    | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| COBALT                       | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| COPPER                       | <0.005        | NA            | NA            | NA            | 0.0000  | 0.0000                |
| IRON                         | 0.02          | NA            | NA            | NA            | 0.0200  | 0.0000                |
| LEAD                         | <0.05         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| CHROMIUM                     | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| NICKEL                       | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| BERYLLIUM                    | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| MOLYBDENUM                   | <0.02         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| CALCIUM                      | <0.05         | 0.5/0.5       | NA            | NA            | 0.2500  | 0.2500                |
| VANADIUM                     | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| ALUMINUM                     | <0.02         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| MAGNESIUM                    | <0.05         | 0.1           | NA            | NA            | 0.0500  | 0.0500                |
| BARIUM                       | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| POTASSIUM                    | <0.05         | 0.05          | NA            | NA            | 0.0250  | 0.0250                |
| STRONTIUM                    | <0.01         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| SODIUM                       | <0.5          | <0.5          | NA            | NA            | 0.0000  | 0.0000                |
| ARSENIC (µg/L)               | <1/<2         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| SELENIUM (µg/L)              | <1/<2         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| MERCURY (µg/L)               | <0.05         | NA            | NA            | NA            | 0.0000  | 0.0000                |
| CATION EQUIVALENCE           | 0.00          | 0.03          | 0.00          | 0.00          |         |                       |
| ANION EQUIVALENCE            | 0.02          | 0.02          | 0.00          | 0.00          |         |                       |
| CHARGE BALANCE ERROR         | -93.08        | 26.59         | -             | -             |         |                       |
| BTX (µg/L)                   |               |               |               |               |         |                       |
| BENZENE                      | NA            | <2            | NA            | <2            | 0.0000  | 0.0000                |
| TOLUENE                      | NA            | <1            | NA            | <1            | 0.0000  | 0.0000                |
| XYLENE                       | NA            | <2            | NA            | <2            | 0.0000  | 0.0000                |
| TOTAL BTX                    | -             | 0             | -             | 0             | 0.0000  | 0.0000                |

## Appendix 6: Groundwater

| PIEZOMETER              | TRIP<br>BLANK | TRIP<br>BLANK | TRIP<br>BLANK | TRIP<br>BLANK | Average | Standard<br>Deviation |
|-------------------------|---------------|---------------|---------------|---------------|---------|-----------------------|
| PAHs (µg/L)             |               |               |               |               |         |                       |
| NAPHTHALENE             | 0.05          | <0.1          | <0.1          | <0.1          | 0.0125  | 0.0217                |
| ACENAPHTHYLENE          | <0.01         | <0.1          | <0.1          | <0.1          | 0.0000  | 0.0000                |
| ACENAPHTHENE            | <0.01         | <0.1          | <0.1          | <0.1          | 0.0000  | 0.0000                |
| FLUORENE                | <0.01         | <0.1          | <0.1          | <0.1          | 0.0000  | 0.0000                |
| PHENANTHRENE            | 0.03          | <0.1          | <0.1          | <0.1          | 0.0075  | 0.0130                |
| ANTHRACENE              | <0.01         | <0.1          | <0.1          | <0.1          | 0.0000  | 0.0000                |
| FLUORANTHENE            | <0.01         | <0.1          | <0.1          | <0.1          | 0.0000  | 0.0000                |
| PYRENE                  | <0.01         | <0.1          | <0.1          | <0.2          | 0.0000  | 0.0000                |
| BENZO(a)ANTHRACENE      | <0.02         | <0.1          | <0.1          | <0.2          | 0.0000  | 0.0000                |
| CHRYSENE                | <0.02         | <0.1          | <0.1          | <0.2          | 0.0000  | 0.0000                |
| BENZO(b)FLUORANTHENE    | <0.05         | <0.2          | <0.2          | <0.2          | 0.0000  | 0.0000                |
| BENZO(k)FLUORANTHENE    | <0.05         | <0.1          | <0.1          | <0.2          | 0.0000  | 0.0000                |
| BENZO(a)PYRENE          | <0.05         | <0.1          | <0.1          | <0.5          | 0.0000  | 0.0000                |
| PERYLENE                | <0.05         | <0.1          | <0.1          | <0.5          | 0.0000  | 0.0000                |
| INDENO(1,2,3-C,D)PYRENE | <0.1          | <0.1          | <0.1          | <0.5          | 0.0000  | 0.0000                |
| DIBENZO(a,h)ANTHRACENE  | <0.2          | <0.5          | <0.5          | <0.5          | 0.0000  | 0.0000                |
| BENZO(g,h,i)PERYLENE    | <0.1          | <0.5          | <0.5          | <0.5          | 0.0000  | 0.0000                |
| TOTAL PAHs              | 0.08          | 0             | 0             | 0             | 0.0800  | 0.0000                |

\* All Units are mg/L unless otherwise specified.

NA Not Analyzed

**SEEPAGE WATER AND SEDIMENTS**

## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER              | SP-A1      | SP-A2      | SP-A2     | SP-A2     | SP-A3      |
|------------------------------|------------|------------|-----------|-----------|------------|
| Sample Date                  | 88/09/06   | 88/09/06   | 88/11/21  | 89/06/02  | 88/09/06   |
| BAS Reference Number         | 8809030-06 | 8809030-08 | 8811121-0 | 8906022-1 | 8809030-07 |
| Sampling Level               | 2          | 3          |           | 2+        | 2          |
| pH                           | 11.92      | 9.03       | 9.68      | 11.79     | 8.24       |
| Specific Conductance (uS/cm) | 3920       | 1530       | 1460      | 4850      | 1100       |
| Temperature (C)              | NA         | NA         | 3         | 15        | 20         |
| Dissolved Oxygen             | NA         | NA         | NA        | NA        | 3.8        |
| Dissolved Inorganic Carbon   | 10         | 9          | 34        | NA        | 27         |
| Alkalinity (as CaCO3)        | 480        | 35         | NA        | 490       | 101        |
| Sulphide                     | <0.05      | 0.02       | NA        | NA        | <0.05      |
| Total Cyanide                | NA         | <0.002     | <0.002    | 0.007     | -          |
| Bromide                      | <3         | <1         | <0.5      | <1        | <1         |
| Chloride                     | 74         | 85         | 81        | 116       | 90         |
| Fluoride                     | 0.50       | 0.40       | 0.6       | 1.2       | 0.30       |
| Sulphate                     | 490        | 480        | 530       | 610       | 230        |
| Nitrate-N                    | 6.5        | <0.1       | NA        | <0.2      | 0.10       |
| Ammonia-N                    | NA         | 4.2        | NA        | NA        | NA         |
| Total Kjeldahl Nitrogen      | 2.9/3.4    | 5.0        | 5         | NA        | 6.3        |
| Total Phosphorous            | NA         | 0.015      | 0.017     | NA        | NA         |
| Dissolved Organic Carbon     | 5.5        | 6.0        | NA        | 7         | 5          |
| Phenol                       | 0.027      | 0.011      | NA        | 0.018     | 0.005      |
| Oil and Grease               | NA         | NA         | NA        | NA        | NA         |
| Zinc                         | <0.01      | <0.01      | NA        | <0.01     | <0.01      |
| Cadmium                      | 0.0010     | 0.0006     | NA        | <0.005    | 0.0008     |
| Manganese                    | <0.01      | 0.11       | NA        | 0.01      | 0.30       |
| Cobalt                       | 0.01       | <0.01      | NA        | <0.01     | <0.01      |
| Copper                       | <0.005     | <0.005     | NA        | <0.005    | <0.005     |
| Iron                         | 0.04       | 0.02       | NA        | 0.1       | 0.10       |
| Lead                         | <0.05      | <0.05      | NA        | <0.05     | <0.05      |
| Chromium                     | 0.01       | <0.01      | NA        | 0.02      | <0.01      |
| Nickel                       | <0.01      | <0.01      | NA        | 0.01      | <0.01      |
| Beryllium                    | <0.01      | <0.01      | NA        | <0.01     | <0.01      |
| Molybdenum                   | 0.06       | 0.04       | NA        | 0.04      | 0.02       |
| Calcium                      | 230        | 121        | 140       | 270       | 87         |
| Vanadium                     | 0.04       | 0.01       | NA        | 0.03      | <0.01      |
| Aluminum                     | 0.48       | 0.22       | NA        | 0.34      | 0.16       |
| Magnesium                    | 0.25       | 4.3        | 4.2       | 0.05      | 6.0        |
| Barium                       | 0.08       | 0.16       | NA        | 0.07      | 0.19       |
| Potassium                    | 240        | 45         | 48        | 230       | 18.3       |
| Strontium                    | 1.19       | 0.73       | NA        | 1.26      | 0.47       |
| Sodium                       | 103        | 106        | 109       | 129       | 80         |
| Selenium (ug/L)              | NA         | <1         | NA        | NA        | NA         |
| Arsenic (ug/L)               | NA         | 11         | NA        | NA        | NA         |
| Mercury (ug/L)               | NA         | <0.05      | NA        | NA        | NA         |

## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER               | SP-A1      | SP-A2      | SP-A2     | SP-A2     | SP-A3      |
|-------------------------------|------------|------------|-----------|-----------|------------|
| Sample Date                   | 88/09/06   | 88/09/06   | 88/11/21  | 89/06/02  | 88/09/06   |
| BAS Reference Number          | 8809030-06 | 8809030-08 | 8811121-0 | 8906022-1 | 8809030-07 |
| Sampling Level                | 2          | 3          |           | 2+        | 2          |
| BTX (ug/L)                    |            |            |           |           |            |
| Benzene                       | NA         | NA         | <2        | <2        | NA         |
| Toluene                       | NA         | NA         | <1        | <1        | NA         |
| Xylenes                       | NA         | NA         | <2        | <2        | NA         |
| Total BTX                     | NA         | NA         | 0         | 0         | NA         |
| PAHs (ug/L)                   |            |            |           |           |            |
| Naphthalene                   | 8.7        | 2.6        | 6.3       | 8.4       | 0.05       |
| Acenaphthylene                | 0.32       | 0.05       | 0.1       | 0.2       | 0.07       |
| Acenaphthene                  | 1.6        | 0.78       | 1.6       | 2         | 0.05       |
| Fluorene                      | 0.96       | 0.48       | 0.7       | 1         | 0.01       |
| Phenanthrene                  | 2.4        | 0.40       | 0.7       | 2.5       | 0.04       |
| Anthracene                    | 0.22       | <0.01      | <0.1      | 0.2       | 0.01       |
| Fluoranthene                  | 1.4        | <0.01      | <0.1      | 0.8       | 0.07       |
| Pyrene                        | 0.96       | <0.01      | <0.1      | 0.5       | 0.06       |
| Benzo(a)anthracene            | 0.05       | <0.02      | <0.1      | <0.2      | <0.02      |
| Chrysene                      | 0.09       | <0.02      | <0.1      | <0.2      | <0.02      |
| Benzo(b)fluoranthene          | <0.05      | <0.05      | <0.2      | <0.2      | <0.05      |
| Benzo(k)fluoranthene          | <0.05      | <0.05      | <0.1      | <0.2      | <0.05      |
| Benzo(a)pyrene                | <0.1       | <0.1       | <0.1      | <0.5      | <0.1       |
| Perylene                      | <0.1       | <0.1       | <0.1      | <0.5      | <0.1       |
| Indeno(1,2,3-c,d)pyrene       | <0.1       | <0.1       | <0.1      | <0.5      | <0.1       |
| Dibenzo(a,h)anthracene        | <0.2       | <0.2       | <0.5      | <0.5      | <0.2       |
| Benzo(g,h,i)perylene          | <0.1       | <0.1       | <0.5      | <0.5      | <0.1       |
| Total PAHs                    | 16.7       | 4.31       | 0         | 0         | 0.36       |
| ND None Detected              |            |            |           |           |            |
| NA Not Analyzed               |            |            |           |           |            |
| Phenol Species Detected       | NA         | ND         | NA        | NA        | NA         |
| Phenol (ug/L)                 |            |            |           |           |            |
| VOCs Detected                 | ND         | ND         | NA        | NA        | ND         |
| Trichlorofluoromethane (ug/L) |            |            |           |           |            |

\* All Units are mg/L unless otherwise specified.

NA - Not Analysed



## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER              | SP-B1      | SP-B1     | SP-P30     | SP-P46     |
|------------------------------|------------|-----------|------------|------------|
| Sample Date                  | 88/09/06   | 88/11/21  | 88/08/31   | 88/08/31   |
| BAS Reference Number         | 8809045-01 | 8811121-0 | 8809030-02 | 8809030-01 |
| Sampling Level               | 1          |           | 1          | 1          |
| pH                           | 6.88       | 7.05      | 7.13       | 8.04       |
| Specific Conductance (uS/cm) | 460        | 470       | 2420       | 520        |
| Temperature (C)              | 17         | 5         | 19         | 19         |
| Dissolved Oxygen             | 3          | NA        | 3.4        | 8.4        |
| Dissolved Inorganic Carbon   | NA         | 171       | NA         | NA         |
| Alkalinity (as CaCO3)        | NA         | NA        | NA         | NA         |
| Sulphide                     | NA         | NA        | NA         | NA         |
| Total Cyanide                | NA         | <0.002    | NA         | NA         |
| Bromide                      | <0.1       | <1        | <2         | <0.1       |
| Chloride                     | 1.86       | 470/470   | 550        | 56         |
| Fluoride                     | 0.06       | <0.5      | 0.25       | 0.04       |
| Sulphate                     | 0.10       | 310/310   | 270        | 33         |
| Nitrate-N                    | <0.01      | NA        | <0.2       | 0.26       |
| Ammonia-N                    | NA         | NA        | NA         | NA         |
| Total Kjeldahl Nitrogen      | NA         | 0.26      | NA         | NA         |
| Total Phosphorous            | NA         | 0.006     | NA         | NA         |
| Dissolved Organic Carbon     | 1.5        | NA        | 23         | 3.5        |
| Phenol                       | <0.001     | NA        | <0.001     | 0.001      |
| Oil and Grease               | 4          | NA        | 3          | 2          |
| Zinc                         | 0.01       | NA        | 0.01       | <0.01      |
| Cadmium                      | 0.0008     | NA        | 0.0006     | 0.0002     |
| Manganese                    | 0.36       | NA        | 3.0        | 0.45       |
| Cobalt                       | <0.01      | NA        | 0.02       | <0.01      |
| Copper                       | <0.005     | NA        | 0.020      | <0.005     |
| Iron                         | 9.1        | NA        | 0.02       | <0.02      |
| Lead                         | <0.05      | NA        | <0.05      | <0.05      |
| Chromium                     | <0.01      | NA        | 0.02       | <0.01      |
| Nickel                       | <0.01      | NA        | 0.02       | <0.01      |
| Beryllium                    | NA         | NA        | NA         | NA         |
| Molybdenum                   | NA         | NA        | NA         | NA         |
| Calcium                      | NA         | 300       | NA         | NA         |
| Vanadium                     | NA         | NA        | NA         | NA         |
| Aluminum                     | NA         | NA        | NA         | NA         |
| Magnesium                    | NA         | 51        | NA         | NA         |
| Barium                       | NA         | NA        | NA         | NA         |
| Potassium                    | NA         | 6.1       | NA         | NA         |
| Strontium                    | NA         | NA        | NA         | NA         |
| Sodium                       | NA         | 58        | NA         | NA         |
| Selenium (ug/L)              | NA         | NA        | NA         | NA         |
| Arsenic (ug/L)               | NA         | NA        | NA         | NA         |
| Mercury (ug/L)               | NA         | NA        | NA         | NA         |

## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER               | SP-B1      | SP-B1     | SP-P30     | SP-P46     |
|-------------------------------|------------|-----------|------------|------------|
| Sample Date                   | 88/09/06   | 88/11/21  | 88/08/31   | 88/08/31   |
| BAS Reference Number          | 8809045-01 | 8811121-0 | 8809030-02 | 8809030-01 |
| Sampling Level                | 1          |           | 1          | 1          |
| BTX (ug/L)                    |            |           |            |            |
| Benzene                       | NA         | <2        | NA         | NA         |
| Toluene                       | NA         | <1        | NA         | NA         |
| Xylenes                       | NA         | <2        | NA         | NA         |
| Total BTX                     | NA         | 0         | NA         | NA         |
| PAHs (ug/L)                   |            |           |            |            |
| Naphthalene                   | 0.14       | <0.1      | NA         | NA         |
| Acenaphthylene                | 0.03       | <0.1      | NA         | NA         |
| Acenaphthene                  | 0.06       | <0.1      | NA         | NA         |
| Fluorene                      | 0.03       | <0.1      | NA         | NA         |
| Phenanthrene                  | 0.08       | <0.1      | NA         | NA         |
| Anthracene                    | 0.01       | <0.1      | NA         | NA         |
| Fluoranthene                  | 0.01       | <0.1      | NA         | NA         |
| Pyrene                        | 0.01       | <0.1      | NA         | NA         |
| Benzo(a)anthracene            | <0.02      | <0.1      | NA         | NA         |
| Chrysene                      | <0.02      | <0.1      | NA         | NA         |
| Benzo(b)fluoranthene          | <0.05      | <0.2      | NA         | NA         |
| Benzo(k)fluoranthene          | <0.05      | <0.1      | NA         | NA         |
| Benzo(a)pyrene                | <0.1       | <0.1      | NA         | NA         |
| Perylene                      | <0.1       | <0.1      | NA         | NA         |
| Indeno(1,2,3-c,d)pyrene       | <0.1       | <0.1      | NA         | NA         |
| Dibenzo(a,h)anthracene        | <0.2       | <0.5      | NA         | NA         |
| Benzo(g,h,i)perylene          | 0.1        | <0.5      | NA         | NA         |
| Total PAHs                    | 0.47       | 0         | 0          | 0          |
| ND None Detected              |            |           |            |            |
| NA Not Analyzed               |            |           |            |            |
| Phenol Species Detected       | 1          | NA        | NA         | NA         |
| Phenol (ug/L)                 |            |           |            |            |
| VOCs Detected                 | 2.1        | NA        | NA         | NA         |
| Trichlorofluoromethane (ug/L) |            |           |            |            |

\* All Units are mg/L unless otherwise specified.  
NA - Not Analysed

## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER              | SP-P47     | SP-P47    | SP-P48     | SP-P49     |
|------------------------------|------------|-----------|------------|------------|
| Sample Date                  | 88/09/02   | 88/11/21  | 88/09/02   | 88/08/31   |
| BAS Reference Number         | 8809029-01 | 8811121-0 | 8809029-02 | 8809030-03 |
| Sampling Level               | 3          |           | 1          | 1          |
| pH                           | 7.03       | 7.02      | 7.92       | 8.04       |
| Specific Conductance (uS/cm) | 2320       | 2690      | 890        | 860        |
| Temperature (C)              | 18         | 4         | 18         | 20         |
| Dissolved Oxygen             | 2.1        | NA        | 2.4        | 4.5        |
| Dissolved Inorganic Carbon   | 48         | 210/210   | NA         | NA         |
| Alkalinity (as CaCO3)        | 169        | NA        | NA         | NA         |
| Sulphide                     | <0.05      | NA        | NA         | NA         |
| Total Cyanide                | <0.002     | <0.002    | NA         | NA         |
| Bromide                      | <1         | <0.05     | <0.5       | 0.7/0.7    |
| Chloride                     | 420        | 1.67      | 121        | 92/93      |
| Fluoride                     | 0.30       | 0.28      | 0.08/0.10  | 0.2/0.1    |
| Sulphate                     | 270        | <0.1      | 154        | 122/126    |
| Nitrate-N                    | 0.40       | NA        | 0.04       | <0.1       |
| Ammonia-N                    | 0.01       | NA        | NA         | NA         |
| Total Kjeldahl Nitrogen      | 0.25       | 1.62      | NA         | NA         |
| Total Phosphorous            | 0.005      | 0.112     | NA         | NA         |
| Dissolved Organic Carbon     | 28         | NA        | 17         | 14.5       |
| Phenol                       | <0.001     | NA        | <0.001     | <0.001     |
| Oil and Grease               | NA         | NA        | 2          | 3          |
| Zinc                         | 0.02       | NA        | 0.02       | 0.01       |
| Cadmium                      | 0.0008     | NA        | 0.0010     | 0.0016     |
| Manganese                    | 0.08       | NA        | <0.01      | 0.01       |
| Cobalt                       | 0.02       | NA        | <0.01      | <0.01      |
| Copper                       | 0.015      | NA        | 0.005      | 0.010      |
| Iron                         | 0.02       | NA        | <0.02      | <0.02      |
| Lead                         | <0.05      | NA        | <0.05      | <0.05      |
| Chromium                     | 0.02       | NA        | 0.01       | <0.01      |
| Nickel                       | 0.01       | NA        | <0.01      | <0.01      |
| Beryllium                    | <0.01      | NA        | NA         | NA         |
| Molybdenum                   | 0.04       | NA        | NA         | NA         |
| Calcium                      | 290        | 57        | NA         | NA         |
| Vanadium                     | 0.02       | NA        | NA         | NA         |
| Aluminum                     | 0.36       | NA        | NA         | NA         |
| Magnesium                    | 50         | 10.5      | NA         | NA         |
| Barium                       | 0.08       | NA        | NA         | NA         |
| Potassium                    | 5.8        | 2.2       | NA         | NA         |
| Strontium                    | 1.16       | NA        | NA         | NA         |
| Sodium                       | 54         | 10.5      | NA         | NA         |
| Selenium (ug/L)              | <1/<2      | NA        | NA         | NA         |
| Arsenic (ug/L)               | <1/<2      | NA        | NA         | NA         |
| Mercury (ug/L)               | <0.05      | NA        | NA         | NA         |

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## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER               | SP-P47     | SP-P47    | SP-P48     | SP-P49     |
|-------------------------------|------------|-----------|------------|------------|
| Sample Date                   | 88/09/02   | 88/11/21  | 88/09/02   | 88/08/31   |
| BAS Reference Number          | 8809029-01 | 8811121-0 | 8809029-02 | 8809030-03 |
| Sampling Level                | 3          |           | 1          | 1          |
| BTX (ug/L)                    |            |           |            |            |
| Benzene                       | NA         | <2        | NA         | NA         |
| Toluene                       | NA         | <1        | NA         | NA         |
| Xylenes                       | NA         | <2        | NA         | NA         |
| Total BTX                     | NA         | 0         | NA         | NA         |
| PAHs (ug/L)                   |            |           |            |            |
| Naphthalene                   | NA         | <0.1      | NA         | NA         |
| Acenaphthylene                | NA         | <0.1      | NA         | NA         |
| Acenaphthene                  | NA         | <0.1      | NA         | NA         |
| Fluorene                      | NA         | <0.1      | NA         | NA         |
| Phenanthrene                  | NA         | <0.1      | NA         | NA         |
| Anthracene                    | NA         | <0.1      | NA         | NA         |
| Fluoranthene                  | NA         | <0.1      | NA         | NA         |
| Pyrene                        | NA         | <0.1      | NA         | NA         |
| Benzo(a)anthracene            | NA         | <0.1      | NA         | NA         |
| Chrysene                      | NA         | <0.1      | NA         | NA         |
| Benzo(b)fluoranthene          | NA         | <0.2      | NA         | NA         |
| Benzo(k)fluoranthene          | NA         | <0.1      | NA         | NA         |
| Benzo(a)pyrene                | NA         | <0.1      | NA         | NA         |
| Perylene                      | NA         | <0.1      | NA         | NA         |
| Indeno(1,2,3-c,d)pyrene       | NA         | <0.1      | NA         | NA         |
| Dibenzo(a,h)anthracene        | NA         | <0.5      | NA         | NA         |
| Benzo(g,h,i)perylene          | NA         | <0.5      | NA         | NA         |
| Total PAHs                    | 0          | 0         | 0          | 0          |
| ND None Detected              |            |           |            |            |
| NA Not Analyzed               |            |           |            |            |
| Phenol Species Detected       |            |           |            |            |
| Phenol (ug/L)                 | NA         | NA        | NA         | NA         |
| VOCs Detected                 |            |           |            |            |
| Trichlorofluoromethane (ug/L) | NA         | NA        | NA         | NA         |

\* All Units are mg/L unless otherwise specified.

NA - Not Analysed

## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER                    | SP-P50     | SP-P51     | SP-P52     |
|------------------------------------|------------|------------|------------|
| Sample Date                        | 88/09/02   | 88/08/31   | 88/08/31   |
| BAS Reference Number               | 8809029-03 | 8809030-04 | 8809030-05 |
| Sampling Level                     | 1          | 1          | 1          |
| pH                                 | 7.03       | 7.34       | 7.53       |
| Specific Conductance (uS/cm)       | 2320       | 2370       | 2060       |
| Temperature (C)                    | 18         | 19         | 19         |
| Dissolved Oxygen                   | 2.6        | 3.6        | 3.8        |
| Dissolved Inorganic Carbon         | NA         | NA         | NA         |
| Alkalinity (as CaCO <sub>3</sub> ) | NA         | NA         | NA         |
| Sulphide                           | NA         | NA         | NA         |
| Total Cyanide                      | NA         | NA         | NA         |
| Bromide                            | <2         | <2         | <2         |
| Chloride                           | 500        | 470        | 360        |
| Fluoride                           | <0.2       | 0.50       | 0.50       |
| Sulphate                           | 270        | 260        | 300        |
| Nitrate-N                          | <0.2       | <0.2       | 0.25       |
| Ammonia-N                          | NA         | NA         | NA         |
| Total Kjeldahl Nitrogen            | NA         | NA         | NA         |
| Total Phosphorous                  | NA         | NA         | NA         |
| Dissolved Organic Carbon           | 25         | 26         | 31         |
| Phenol                             | <0.001     | <0.001     | <0.001     |
| Oil and Grease                     | 2          | 4          | 4          |
| Zinc                               | 0.20       | 0.02/0.01  | 0.03       |
| Cadmium                            | 0.0014     | 0.0010     | 0.0010     |
| Manganese                          | 5.4        | 0.04/0.04  | 0.01       |
| Cobalt                             | 0.02       | 0.02/0.02  | 0.02       |
| Copper                             | 0.025      | 0.020      | 0.045      |
| Iron                               | 0.02       | 0.02/0.02  | 0.02       |
| Lead                               | <0.05      | <0.05      | <0.05      |
| Chromium                           | 0.02       | 0.02/0.02  | 0.02       |
| Nickel                             | 0.01       | 0.01/0.01  | 0.01       |
| Beryllium                          | NA         | NA         | NA         |
| Molybdenum                         | NA         | NA         | NA         |
| Calcium                            | NA         | NA         | NA         |
| Vanadium                           | NA         | NA         | NA         |
| Aluminum                           | NA         | NA         | NA         |
| Magnesium                          | NA         | NA         | NA         |
| Barium                             | NA         | NA         | NA         |
| Potassium                          | NA         | NA         | NA         |
| Strontium                          | NA         | NA         | NA         |
| Sodium                             | NA         | NA         | NA         |
| Selenium (ug/L)                    | NA         | NA         | NA         |
| Arsenic (ug/L)                     | NA         | NA         | NA         |
| Mercury (ug/L)                     | NA         | NA         | NA         |

## Appendix 6: St. Marys River Seepage Water

| MINI PIEZOMETER               | SP-P50     | SP-P51     | SP-P52     |
|-------------------------------|------------|------------|------------|
| Sample Date                   | 88/09/02   | 88/08/31   | 88/08/31   |
| BAS Reference Number          | 8809029-03 | 8809030-04 | 8809030-05 |
| Sampling Level                | 1          | 1          | 1          |
| BTX (ug/L)                    |            |            |            |
| Benzene                       | NA         | NA         | NA         |
| Toluene                       | NA         | NA         | NA         |
| Xylenes                       | NA         | NA         | NA         |
| Total BTX                     | NA         | NA         | NA         |
| PAHs (ug/L)                   |            |            |            |
| Naphthalene                   | NA         | NA         | NA         |
| Acenaphthylene                | NA         | NA         | NA         |
| Acenaphthene                  | NA         | NA         | NA         |
| Fluorene                      | NA         | NA         | NA         |
| Phenanthrene                  | NA         | NA         | NA         |
| Anthracene                    | NA         | NA         | NA         |
| Fluoranthene                  | NA         | NA         | NA         |
| Pyrene                        | NA         | NA         | NA         |
| Benzo(a)anthracene            | NA         | NA         | NA         |
| Chrysene                      | NA         | NA         | NA         |
| Benzo(b)fluoranthene          | NA         | NA         | NA         |
| Benzo(k)fluoranthene          | NA         | NA         | NA         |
| Benzo(a)pyrene                | NA         | NA         | NA         |
| Perylene                      | NA         | NA         | NA         |
| Indeno(1,2,3-c,d)pyrene       | NA         | NA         | NA         |
| Dibenzo(a,h)anthracene        | NA         | NA         | NA         |
| Benzo(g,h,i)perylene          | NA         | NA         | NA         |
| Total PAHs                    | 0          | 0          | 0          |
| ND None Detected              |            |            |            |
| NA Not Analyzed               |            |            |            |
| Phenol Species Detected       | NA         | NA         | NA         |
| Phenol (ug/L)                 |            |            |            |
| VOCs Detected                 | NA         | NA         | NA         |
| Trichlorofluoromethane (ug/L) |            |            |            |

\* All Units are mg/L unless otherwise specified.  
NA - Not Analysed

## Appendix 6: Creek Bed Seepage Water

| MINI-PIEZOMETER              | CBA1-1    | CBA1-2    | CBB1-1    | CBB2-2              | CBC1-2    |
|------------------------------|-----------|-----------|-----------|---------------------|-----------|
| LAB ID.                      | MPA1-1    | MPA1-2    | MP81-1    | Composite<br>MP82-1 | MPC1-2    |
| SAMPLE DATE                  | 89/06/02  | 89/06/02  | 89/06/02  | 89/06/02            | 89/06/02  |
| BAS REF NO.                  | 8906018-3 | 8906018-9 | 8906018-4 | 8906018-8           | 8906018-5 |
| pH                           | 6.57      | NA        | 6.61      | 6.85                | 6.88      |
| SPECIFIC CONDUCTANCE (uS/cm) | 4050      | NA        | 3750*     | 11980*              | 1490      |
| TEMPERATURE (C)              | 15        | NA        | 11        | 14                  | 12        |
| DISSOLVED OXYGEN             | NA        | NA        | NA        | NA                  | NA        |
| DIC                          | NA        | NA        | NA        | NA                  | NA        |
| ALKALINITY                   | 112       | 101/99    | 32        | 146                 | 300       |
| SULPHIDE                     | NA        | NA        | NA        | NA                  | NA        |
| TOTAL CYANIDE                | 0.071     | NA        | 0.067     | NA                  | <0.002    |
| BROMIDE                      | <1        | <1        | <1        | 0.05                | <0.5/<0.5 |
| CHLORIDE                     | 290       | 260       | 200       | 4.8                 | 147/145   |
| FLUORIDE                     | 1.6       | 1.4       | 1.8       | 0.24                | 0.80/0.60 |
| SULPHATE                     | 1150      | 890       | 1360      | 37                  | 87/82     |
| NITRATE-N                    | <0.2      | <0.2      | <0.2      | <0.01               | <0.1/<0.1 |
| AMMONIA-N                    | NA        | NA        | NA        | NA                  | NA        |
| TOTAL KJELDAHL NITROGEN      | 13.8      | 7.8       | 50        | 1.92                | 0.45      |
| TOTAL PHOSPHOROUS            | 0.002     | 0.003     | 0.01      | 0.006               | 0.001     |
| DOC                          | 22        | 59        | 13.7      | 45/46               | 195       |
| PHENOLS                      | 0.012     | 0.006     | 0.017     | 0.004               | <0.001    |
| PCB                          | NA        | NA        | NA        | NA                  | NA        |
| OIL AND GREASE               | NA        | NA        | NA        | NA                  | NA        |
| ZINC                         | 0.03      | NA        | 0.04      | NA                  | 0.02      |
| CADMIUM                      | <0.005    | NA        | <0.005    | NA                  | <0.005    |
| MANGANESE                    | 5.2       | NA        | 4.1       | NA                  | 1.1       |
| COBALT                       | 0.04      | NA        | 0.03      | NA                  | <0.01     |
| COPPER                       | 0.01      | NA        | 0.005     | NA                  | <0.005    |
| IRON                         | 88        | NA        | 260       | NA                  | 12.7      |
| LEAD                         | <0.05     | NA        | <0.05     | NA                  | <0.05     |
| CHROMIUM                     | 0.03      | NA        | 0.03      | NA                  | <0.01     |
| NICKEL                       | 0.02      | NA        | 0.01      | NA                  | <0.01     |
| BERYLLIUM                    | <0.01     | NA        | <0.01     | NA                  | <0.01     |
| MOLYBDENUM                   | 0.02      | NA        | 0.04      | NA                  | <0.02     |
| CALCIUM                      | 370       | NA        | 270       | NA                  | 153       |
| VANADIUM                     | 0.03      | NA        | 0.04      | NA                  | 0.02      |
| ALUMINUM                     | 0.4       | NA        | 0.32      | NA                  | 0.16      |
| MAGNESIUM                    | 76        | NA        | 34        | NA                  | 34        |
| BARIUM                       | 0.05      | NA        | 0.12      | NA                  | 0.27      |
| POTASSIUM                    | 54        | NA        | 126       | NA                  | 6.9       |
| STRONTIUM                    | 1.63      | NA        | 2.1       | NA                  | 0.58      |
| SODIUM                       | 128       | NA        | 64        | NA                  | 28        |
| ARSENIC (ug/L)               | NA        | NA        | NA        | NA                  | NA        |
| SELENIUM (ug/L)              | NA        | NA        | NA        | NA                  | NA        |
| MERCURY (ug/L)               | NA        | NA        | NA        | NA                  | NA        |

## Appendix 6: Creek Bed Seepage Water

| MINI-PIEZOMETER         | CBA1-1 | CBA1-2 | CBB1-1 | CBB2-2 | CBC1-2 |
|-------------------------|--------|--------|--------|--------|--------|
| BTX (ug/L)              |        |        |        |        |        |
| BENZENE                 | <2     | NA     | 2/2    | NA     | <2     |
| TOLUENE                 | <1     | NA     | <1/<1  | NA     | <1     |
| XYLENE                  | <2     | NA     | <2/<2  | NA     | <2     |
| TOTAL BTX               | 0      | NA     | 2/2    | NA     | 0      |
| PAHs (ug/L)             |        |        |        |        |        |
| NAPHTHALENE             | 1.8    | NA     | 0.2    | NA     | 25     |
| ACENAPHTHYLENE          | 1.7    | NA     | <0.1   | NA     | 0.7    |
| ACENAPHTHENE            | 2.9    | NA     | <0.1   | NA     | 0.8    |
| FLUORENE                | 0.1    | NA     | <0.1   | NA     | <0.1   |
| PHENANTHRENE            | <0.1   | NA     | <0.1   | NA     | <0.1   |
| ANTHRACENE              | <0.1   | NA     | <0.1   | NA     | <0.1   |
| FLUORANTHENE            | <0.1   | NA     | <0.1   | NA     | <0.1   |
| PYRENE                  | <0.2   | NA     | <0.2   | NA     | <0.2   |
| BENZO(a)ANTHRACENE      | <0.2   | NA     | <0.2   | NA     | <0.2   |
| CHRYSENE                | <0.2   | NA     | <0.2   | NA     | <0.2   |
| BENZO(b)FLUORANTHENE    | <0.2   | NA     | <0.2   | NA     | <0.2   |
| BENZO(k)FLUORANTHENE    | <0.2   | NA     | <0.2   | NA     | <0.2   |
| BENZO(a)PYRENE          | <0.5   | NA     | <0.5   | NA     | <0.5   |
| PERYLENE                | <0.5   | NA     | <0.5   | NA     | <0.5   |
| INDENO(1,2,3-C,D)PYRENE | <0.5   | NA     | <0.5   | NA     | <0.5   |
| DIBENZO(a,h)ANTHRACENE  | <0.5   | NA     | <0.5   | NA     | <0.5   |
| BENZO(g,h,i)PERYLENE    | <0.5   | NA     | <0.5   | NA     | <0.5   |
| TOTAL PAHs              | 6.5    | NA     | 0.2    | NA     | 26.5   |

\* Meter Malfunctioning

All Units are mg/L unless otherwise specified.

NA - Not Analyzed



## Appendix 6: Creek Bed Seepage Water

| MINI-PIEZOMETER              | CBC1-3    | CBC2-1     | CBC2-2     | CBC3-1     | CBC3-2     |
|------------------------------|-----------|------------|------------|------------|------------|
| LAB I.D.                     | MPC1-3    | MPC2-E     | MPC2-W     | MPC3-E     | MBC3-W     |
| SAMPLE DATE                  | 89/06/02  | 89/06/02   | 89/06/02   | 89/06/02   | 89/06/02   |
| BAS REF NO.                  | 8906018-6 | 8906018-13 | 8906018-12 | 8906018-10 | 8906018-11 |
| pH                           | 6.62      | NA         | NA         | NA         | NA         |
| SPECIFIC CONDUCTANCE (uS/cm) | 6220      | NA         | NA         | NA         | NA         |
| TEMPERATURE (C)              | 15        | NA         | NA         | NA         | NA         |
| DISSOLVED OXYGEN             | NA        | NA         | NA         | NA         | NA         |
| DIC                          | NA        | NA         | NA         | NA         | NA         |
| ALKALINITY                   | 230       | 250        | 135        | 65         | 129        |
| SULPHIDE                     | NA        | NA         | NA         | NA         | NA         |
| TOTAL CYANIDE                | <0.002    | NA         | NA         | NA         | NA         |
| BROMIDE                      | <1        | 0.5        | <1         | <1         | <1         |
| CHLORIDE                     | 1190      | 390        | 600        | 920        | 820        |
| FLUORIDE                     | 1.5       | 1.7        | <0.5       | 0.6        | <0.5       |
| SULPHATE                     | 900       | 31         | 149        | 160        | 200/200    |
| NITRATE-N                    | <0.2      | <0.1       | <0.2       | <0.2       | <0.2       |
| AMMONIA-N                    | NA        | NA         | NA         | NA         | NA         |
| TOTAL KJELDAHL NITROGEN      | 0.86/0.89 | 12.6/12.8  | 7.6        | 8.6        | 3.5        |
| TOTAL PHOSPHOROUS            | 0.01      | 0.016      | 0.93       | 0.028      | 0.005      |
| DOC                          | 41        | 554        | 1050       | 147        | 163        |
| PHENOLS                      | 0.001     | NA         | NA         | NA         | NA         |
| PCB                          | NA        | NA         | NA         | NA         | NA         |
| OIL AND GREASE               | NA        | NA         | NA         | NA         | NA         |
| ZINC                         | 0.04      | NA         | NA         | NA         | NA         |
| CADMIUM                      | <0.005    | NA         | NA         | NA         | NA         |
| MANGANESE                    | 11        | NA         | NA         | NA         | NA         |
| COBALT                       | 0.06      | NA         | NA         | NA         | NA         |
| COPPER                       | 0.015     | NA         | NA         | NA         | NA         |
| IRON                         | 1.9       | NA         | NA         | NA         | NA         |
| LEAD                         | <0.05     | NA         | NA         | NA         | NA         |
| CHROMIUM                     | 0.05      | NA         | NA         | NA         | NA         |
| NICKEL                       | 0.05      | NA         | NA         | NA         | NA         |
| BERYLLIUM                    | <0.01     | NA         | NA         | NA         | NA         |
| MOLYBDENUM                   | 0.04      | NA         | NA         | NA         | NA         |
| CALCIUM                      | 790       | NA         | NA         | NA         | NA         |
| VANADIUM                     | 0.04      | NA         | NA         | NA         | NA         |
| ALUMINUM                     | 0.98      | NA         | NA         | NA         | NA         |
| MAGNESIUM                    | 123       | NA         | NA         | NA         | NA         |
| BARIUM                       | 0.11      | NA         | NA         | NA         | NA         |
| POTASSIUM                    | 13.9      | NA         | NA         | NA         | NA         |
| STRONTIUM                    | 2.9       | NA         | NA         | NA         | NA         |
| SODIUM                       | 44        | NA         | NA         | NA         | NA         |
| ARSENIC (ug/L)               | NA        | NA         | NA         | NA         | NA         |
| SELENIUM (ug/L)              | NA        | NA         | NA         | NA         | NA         |
| MERCURY (ug/L)               | NA        | NA         | NA         | NA         | NA         |

## Appendix 6: Creek Bed Seepage Water

| MINI-PIEZOMETER         | CBC1-3 | CBC2-1 | CBC2-2 | CBC3-1 | CBC3-2 |
|-------------------------|--------|--------|--------|--------|--------|
| BTX (ug/L)              |        |        |        |        |        |
| BENZENE                 | 13     | NA     | NA     | NA     | NA     |
| TOLUENE                 | <1     | NA     | NA     | NA     | NA     |
| XYLENE                  | <2     | NA     | NA     | NA     | NA     |
| TOTAL BTX               | 13     | NA     | NA     | NA     | NA     |
| PAHs (ug/L)             |        |        |        |        |        |
| NAPHTHALENE             | <0.1   | NA     | NA     | NA     | NA     |
| ACENAPHTHYLENE          | <0.1   | NA     | NA     | NA     | NA     |
| ACENAPHTHENE            | <0.1   | NA     | NA     | NA     | NA     |
| FLUORENE                | <0.1   | NA     | NA     | NA     | NA     |
| PHENANTHRENE            | <0.1   | NA     | NA     | NA     | NA     |
| ANTHRACENE              | <0.1   | NA     | NA     | NA     | NA     |
| FLUORANTHENE            | <0.1   | NA     | NA     | NA     | NA     |
| PYRENE                  | <0.2   | NA     | NA     | NA     | NA     |
| BENZO(a)ANTHRACENE      | <0.2   | NA     | NA     | NA     | NA     |
| CHRYSENE                | 0.5    | NA     | NA     | NA     | NA     |
| BENZO(b)FLUORANTHENE    | <0.2   | NA     | NA     | NA     | NA     |
| BENZO(k)FLUORANTHENE    | <0.2   | NA     | NA     | NA     | NA     |
| BENZO(a)PYRENE          | <0.5   | NA     | NA     | NA     | NA     |
| PERYLENE                | <0.5   | NA     | NA     | NA     | NA     |
| INDENO(1,2,3-C,D)PYRENE | <0.5   | NA     | NA     | NA     | NA     |
| DIBENZO(a,h)ANTHRACENE  | <0.5   | NA     | NA     | NA     | NA     |
| BENZO(g,h,i)PERYLENE    | <0.5   | NA     | NA     | NA     | NA     |
| TOTAL PAHs              | 0.5    | NA     | NA     | NA     | NA     |

\* Meter Malfunctioning

All Units are mg/L unless otherwise specified.

NA - Not Analyzed

# SEDIMENT ANALYSES

| Sample ID                    | A4 0-10    | A4 20-30   |
|------------------------------|------------|------------|
| Sample Date                  | 07/88      | 07/88      |
| Sampling Level               | 2          | 2          |
| BAS Reference Number         | 8808085-06 | 8808085-07 |
| pH                           | 8.7        | 9.2        |
| Specific Conductance (uS/cm) | 370        | 297        |
| Loss on Ignition (%)         | 0.49       | 0.81       |
| Moisture Content (%)         | 13.8       | 15.1       |
| Phenols                      | <0.5       | <0.5       |
| Oil & Grease                 | 150        | 45         |
| Total Phosphorous            | 400        | 340        |
| Bromide                      | -          | -          |
| Chloride                     | -          | -          |
| Fluoride                     | -          | -          |
| Nitrate-N                    | -          | -          |
| Ammonia-N                    | 7          | 7          |
| Total Kjeldahl Nitrogen      | 260        | 44         |
| Sulphate                     | -          | -          |
| Zinc                         | 35         | 15         |
| Cadmium                      | 0.05       | <0.05      |
| Manganese                    | 1560       | 450        |
| Cobalt                       | 5          | 4          |
| Copper                       | 11         | 7          |
| Iron                         | 15500      | 10800      |
| Lead                         | 10         | 4          |
| Chromium                     | 34         | 15         |
| Nickel                       | 8          | 5          |
| Beryllium                    | <1         | <1         |
| Molybdenum                   | <2         | <2         |
| Calcium                      | 26000      | 5000       |
| Vanadium                     | 35         | 28         |
| Aluminum                     | 12000      | 5100       |
| Magnesium                    | 4000       | 2200       |
| Barium                       | 33         | 20         |
| Potassium                    | 1030       | 870        |
| Strontium                    | 28         | 16         |
| Sodium                       | 530        | 330        |
| PAHs                         |            |            |
| Naphthalene                  | 0.021      | 0.005      |
| Acenaphthylene               | 0.010      | 0.003      |
| Acenaphthene                 | 0.017      | 0.005      |
| Fluorene                     | 0.012      | 0.007      |
| Phenanthrene                 | 0.172      | 0.047      |
| Anthracene                   | 0.032      | 0.009      |
| Fluoranthene                 | 0.45       | 0.084      |
| Pyrene                       | 0.38       | 0.079      |
| Benzo(a)anthracene           | 0.24       | 0.044      |
| Chrysene                     | 0.31       | 0.063      |
| Benzo(b)fluoranthene         | 0.33       | 0.072      |
| Benzo(k)fluoranthene         | 0.24       | 0.035      |
| Benzo(a)pyrene               | 0.31       | 0.046      |
| Perylene                     | 0.094      | 0.011      |
| Indeno(1,2,3-c,d)pyrene      | 0.39       | 0.058      |
| Dibenzo(a,h)anthracene       | 0.08       | 0.026      |
| Benzo(g,h,i)perylene         | 0.35       | 0.057      |
| Total PAHs                   | 3.438      | 0.651      |

\* All Units are ug/g unless otherwise specified.

# SEDIMENT ANALYSES

| Sample ID                    | A5 0-10    | A5 20-30   | A5 40-50   | A5 60-70   |
|------------------------------|------------|------------|------------|------------|
| Sample Date                  | 07/88      | 07/88      | 07/88      | 07/88      |
| Sampling Level               | 2          | 1          | 2          | 1          |
| BAS Reference Number         | 8808085-08 | 8808085-01 | 8808085-09 | 8808085-02 |
| pH                           | 11.0       | 11.1       | 10.9       | 10.6       |
| Specific Conductance (uS/cm) | 1320       | 1460       | 1320       | 548        |
| Loss on Ignition (%)         | 2.6/2.4    | 3.1        | 2.4        | 1.38       |
| Moisture Content (%)         | 23/23      | 15.6       | 16.5       | 16.3       |
| Phenols                      | <0.5       | <0.5       | <0.5       | <0.5       |
| Oil & Grease                 | 550        | 340        | 430        | 98         |
| Total Phosphorous            | 580        | -          | 700        | -          |
| Bromide                      | -          | <2         | -          | <2         |
| Chloride                     | -          | 17.1/16.5  | -          | 26         |
| Fluoride                     | -          | 19.4       | -          | 2.7        |
| Nitrate-N                    | -          | <0.2       | -          | 1.6        |
| Ammonia-N                    | 14         | -          | 9          | -          |
| Total Kjeldahl Nitrogen      | 42         | -          | 23         | -          |
| Sulphate                     | -          | 560        | -          | 184        |
| Zinc                         | 46         | 55         | 65/61      | 31         |
| Cadmium                      | <0.05      | <0.05      | <0.05      | <0.05      |
| Manganese                    | 23000      | 34000      | 33000      | 3600       |
| Cobalt                       | 13         | 17         | 16/16      | 8          |
| Copper                       | 33         | 36         | 33/33      | 12         |
| Iron                         | 87000      | 144000     | 127000     | 32000      |
| Lead                         | 85         | 55         | 89/92      | 8          |
| Chromium                     | 300        | 430        | 400/380    | 60         |
| Nickel                       | 27         | 34         | 47         | 12         |
| Beryllium                    | 1          | -          | 1/1        | -          |
| Molybdenum                   | 10         | -          | 12/12      | -          |
| Calcium                      | 65000      | -          | 97000      | -          |
| Vanadium                     | 160        | -          | 210/200    | -          |
| Aluminum                     | 9800       | -          | 11100      | -          |
| Magnesium                    | 15900      | -          | 21000      | -          |
| Barium                       | 42         | -          | 57/58      | -          |
| Potassium                    | 830        | -          | 980/930    | -          |
| Strontium                    | 54         | -          | 76/76      | -          |
| Sodium                       | 1470       | -          | 1920/1900  | -          |
| PAHs                         |            |            |            |            |
| Naphthalene                  | 0.093      | -          | 0.063      | -          |
| Acenaphthylene               | 0.16       | -          | 0.21       | -          |
| Acenaphthene                 | 0.26       | -          | 0.32       | -          |
| Fluorene                     | 0.26       | -          | 0.34       | -          |
| Phenanthrene                 | 2.4        | -          | 2.7        | -          |
| Anthracene                   | 0.44       | -          | 0.49       | -          |
| Fluoranthene                 | 4.0        | -          | 3.7        | -          |
| Pyrene                       | 2.5        | -          | 2.4        | -          |
| Benzo(a)anthracene           | 1.53       | -          | 1.53       | -          |
| Chrysene                     | 1.55       | -          | 1.52       | -          |
| Benzo(b)fluoranthene         | 2.2        | -          | 2.2        | -          |
| Benzo(k)fluoranthene         | 1.32       | -          | 1.54       | -          |
| Benzo(a)pyrene               | 2.22       | -          | 2.5        | -          |
| Perylene                     | 0.75       | -          | 0.82       | -          |
| Indeno(1,2,3-c,d)pyrene      | 2.4        | -          | 2.8        | -          |
| Dibenzo(a,h)anthracene       | 0.56       | -          | 0.48       | -          |
| Benzo(g,h,i)perylene         | 1.53       | -          | 1.67       | -          |
| Total PAHs                   | 24.17      | -          | 25.28      | -          |

\* All Units are ug/g unless otherwise specified.

# SEDIMENT ANALYSES

| Sample ID                    | B1 0-25    | B1 0-25<br>Duplicate | B1 50-75   | B1 100-125 | B1 150-175 | B1 200-225 | B1 260-270 |
|------------------------------|------------|----------------------|------------|------------|------------|------------|------------|
| Sample Date                  | 07/88      | 07/88                | 07/88      | 07/88      | 07/88      | 07/88      | 07/88      |
| Sampling Level               | 2          | 2                    | 1          | 2          | 1          | 1          | 2          |
| BAS Reference Number         | 8808085-10 | 8808085-13           | 8808085-03 | 8808085-11 | 8808085-04 | 8808085-05 | 8808085-12 |
| pH                           | 10.6       | 7.0                  | 7.0        | 7.2        | 7.3        | 6.7        | 6.9/7.0    |
| Specific Conductance (uS/cm) | 406        | 391                  | 368        | 273        | 329        | 149        | 47/51      |
| Loss on Ignition (%)         | 12.5       | 10.2                 | 3.8        | 1.84       | 1.84       | 1.15       | 0.40       |
| Moisture Content (%)         | 51         | 53                   | 31         | 26         | 30         | 23         | 16.1       |
| Phenols                      | 1.2        | 1.1                  | <0.5       | <0.5       | <0.5       | <0.5       | <0.5       |
| Oil & Grease                 | 6200       | 5400                 | 690        | 150        | 91         | 55/110     | 52         |
| Total Phosphorous            | 690/700    | 720                  | -          | 340        | -          | -          | 110        |
| Bromide                      | -          | -                    | <2         | -          | <2/<2      | <2         | -          |
| Chloride                     | -          | -                    | 10.2       | -          | 15/23      | 5.3        | -          |
| Fluoride                     | -          | -                    | 3.5        | -          | 5.5/5.4    | 3.6        | -          |
| Nitrate-N                    | -          | -                    | 0.6        | -          | 1.08/<0.5  | 0.5        | -          |
| Ammonia-N                    | 24/22      | 29                   | -          | 22         | -          | -          | 12         |
| Total Kjeldahl Nitrogen      | 1140       | 1320                 | -          | 580/630    | -          | -          | 168        |
| Sulphate                     | -          | -                    | 185        | -          | 68/74      | 81         | -          |
| Zinc                         | 760/750    | 730                  | 54         | 26         | 29/28      | 18         | 6          |
| Cadmium                      | 0.95/0.95  | 0.90                 | 0.10       | 0.05       | 0.05/0.05  | 0.05       | <0.05      |
| Manganese                    | 14100      | 12200                | 430        | 163        | 200/195    | 123        | 54         |
| Cobalt                       | 16/19      | 16                   | 5          | 6          | 7/7        | 4          | 2          |
| Copper                       | 54/59      | 54                   | 9          | 8          | 12/11      | 7          | 3          |
| Iron                         | 95000      | 87000                | 11400      | 10000      | 13500      | 8700       | 5100       |
| Lead                         | 187/195    | 173                  | 13         | 5          | 7/8        | 4          | 2          |
| Chromium                     | 230/260    | 220                  | 18         | 19         | 26/25      | 16         | 6          |
| Nickel                       | 34/44      | 36                   | 8          | 10         | 14/13      | 8          | 4          |
| Beryllium                    | 1/2        | 2                    | -          | <1         | -          | -          | <1         |
| Molybdenum                   | 8/8        | 8                    | -          | <2         | -          | -          | <2         |
| Calcium                      | 56000      | 50000                | -          | 3800       | -          | -          | 1100       |
| Vanadium                     | 119/127    | 115                  | -          | 29         | -          | -          | 15         |
| Aluminum                     | 14100      | 14600                | -          | 8200       | -          | -          | 2600       |
| Magnesium                    | 15600      | 13700                | -          | 2600       | -          | -          | 900        |
| Barium                       | 83/84      | 89                   | -          | 30         | -          | -          | 10         |
| Potassium                    | 1670/1860  | 1920                 | -          | 1240       | -          | -          | 400        |
| Strontium                    | 70/70      | 71                   | -          | 18         | -          | -          | 6          |
| Sodium                       | 1520/1670  | 1510                 | -          | 460        | -          | -          | 165        |
| PAHs                         |            |                      |            |            |            |            |            |
| Naphthalene                  | 46         | 115                  | -          | 0.34       | -          | -          | 0.001      |
| Acenaphthylene               | 4.5        | 4.8                  | -          | 0.014      | -          | -          | <0.001     |
| Acenaphthene                 | 3.1        | 3.5                  | -          | 0.012      | -          | -          | <0.001     |
| Fluorene                     | 8.5        | 8.3                  | -          | 0.020      | -          | -          | <0.001     |
| Phenanthrene                 | 2.4        | 27                   | -          | 0.146      | -          | -          | 0.007      |
| Anthracene                   | 14.0       | 12.3                 | -          | 0.061      | -          | -          | <0.001     |
| Fluoranthene                 | 15.1       | 16.4                 | -          | 0.20       | -          | -          | 0.001      |
| Pyrene                       | 11.6       | 12.8                 | -          | 0.173      | -          | -          | 0.004      |
| Benzo(a)anthracene           | 8.9        | 10.4                 | -          | 0.130      | -          | -          | <0.002     |
| Chrysene                     | 8.7        | 9.9                  | -          | 0.150      | -          | -          | <0.002     |
| Benzo(b)fluoranthene         | 10.1       | 12.6                 | -          | 0.172      | -          | -          | <0.005     |
| Benzo(k)fluoranthene         | 5.9        | 6.7                  | -          | 0.106      | -          | -          | <0.005     |
| Benzo(a)pyrene               | 12.5       | 14.8                 | -          | 0.159      | -          | -          | <0.005     |
| Perylene                     | 4.8        | 5.9                  | -          | 0.085      | -          | -          | <0.005     |
| Indeno(1,2,3-c,d)pyrene      | 10.5       | 12.7                 | -          | 0.165      | -          | -          | <0.01      |
| Dibenzo(a,h)anthracene       | 3.2        | 4.3                  | -          | 0.042      | -          | -          | <0.02      |
| Benzo(g,h,i)perylene         | 8.7        | 10.4                 | -          | 0.162      | -          | -          | <0.01      |
| Total PAHs                   | 178.5      | 287.8                | -          | 2.137      | -          | -          | 0.013      |

\* All Units are ug/g unless otherwise specified.

**GROUNDWATER TRITIUM ANALYSES**

## FACULTY OF SCIENCE

University of Waterloo  
Waterloo, Ontario  
N2L 3G1  
Tel: (519) 885-1211; Ext. 6387

## FACSIMILE MESSAGE SHEET

Date: APRIL 13/89

Attention: Ms. Berry-Spark

Company: Beak

Department: \_\_\_\_\_

Fax #: 416 458 7303

From: Mary Ellen Patton

No. of Pages sent (including this page) 2

OUR FAX NUMBER IS: 519-746-2543

IF YOU DID NOT RECEIVE ALL PAGES,  
PLEASE NOTIFY US AS SOON AS POSSIBLE.

THANK YOU.

Account No.: 652-4310 - 06

Condensed Data output for File 1504- 890663

Garry-Spark/BEAK

03/20/89

LOCATION E - 1

| LAB#  | Sample | 180smow | 2H | 3H | EM2          | 13C | 180pdb | 34S | 180so4 |
|-------|--------|---------|----|----|--------------|-----|--------|-----|--------|
| 19384 | A4-1   |         |    |    | 1.2 +/- 0.8  |     |        |     |        |
| 19385 | B4-1   |         |    |    | 4.9 +/- 0.7  |     |        |     |        |
| 19386 | B2-3   |         |    |    | 25.6 +/- 1.9 |     |        |     |        |
| 19387 | D3-1   |         |    |    | <0.8 +/- 0.6 |     |        |     |        |
| 19388 | D5-1   |         |    |    | 43.3 +/- 3.0 |     |        |     |        |
|       |        |         |    |    | 44.4 +/- 3.1 |     |        |     |        |

TELEFAX TO:

KAREN BERRY-SPARK, BEAK CONSULTANTS

TELEFAX NO:

416-458-7303

TELEFAX FROM:

MARY ELLEN PATTON, EIL, UNIVERSITY OF WATERLOO

DATE:

APRIL 13, 1989



# University of Waterloo



Waterloo, Ontario, Canada  
N2L 3G1

Faculty of Science  
Department of Earth Sciences  
519/885-1211

Telex Number  
069-55259

*Rec'd  
18 July 89*

Environmental Isotope Lab.  
Earth Sciences Department  
July 12, 1989

Ms. K. Berry-Spark  
Contaminant Hydrogeologist  
Beak Consultants Limited  
14 Abacus Road  
Brampton, Ontario  
L6T 5B7

Dear Karen:

Enclosed please find the results of the testing done on the samples you submitted to our lab last month. I hope you are happy with them. I have also faxed these results to you.

As storage space here is scarce, I would appreciate some direction from you as to disposal of these samples. If I do not hear from you within two months (i.e. by September 12, 1989) I will throw them out.

A bill (at priority rates) for these analyses will arrive shortly.

Yours truly

*Mary Ellen*

Mary Ellen Patton

| LAB#  | Sample | 180smow | 2H | 3H | EH3          | 13C | 180pdb | 34S | 180so4 |
|-------|--------|---------|----|----|--------------|-----|--------|-----|--------|
| 20791 | B2-1   |         |    |    | 48.6 +/- 3.1 |     |        |     |        |
|       |        |         |    |    | 50.8 +/- 3.4 |     |        |     |        |
| 20792 | A7-1   |         |    |    | 68.3 +/- 4.6 |     |        |     |        |
| 20793 | B2-3   |         |    |    | 24.2 +/- 1.8 |     |        |     |        |

**GROUNDWATER & ST. MARYS RIVER  
SEEPAGE WATER - VOLATILE  
ORGANIC COMPOUNDS AND  
PHENOLS SPECIES ANALYSES**

**NOVALAB** LTÉE  
LTDTO: Beak Consultants Ltd  
14 Abacus Road  
Brampton, Ontario  
L6T 5B7

DATE: Nov. 11, 1988

CLIENT  
ORDER #: 2460-3Attention: Mr. J.L. Robertson

REPORT #: NL-4211

RE: Analysis of Water Samples

Sir,

Twenty-eight (28) water samples in four (4) groups were received between August 12 and September 6, 1988. Four (4) trip blank samples sent in August were requested not to be analysed. The list of samples received are shown in Table 1. Sixteen (16) of the water samples and one trip blank were analysed for volatile priority pollutants by purge and trap gc/ms (MISA groups 16 and 17). Six (6) of the water samples and one trip blank were analysed for phenolic compounds by gc/ms. These samples were in-situ acetylated prior to the extraction. Among these six (6) water samples, two (2) samples containing the highest amount of phenolic compounds were re-analysed, without acetylation, by gc/ms for nitrophenols at lower detection limits.

The phenolic pollutants analyses were performed on a Hewlett-Packard gc/ms MSD system, and volatile pollutants analyses were performed using a Unacon concentrator interfaced to a Finnigan Ion Trap detector. Library searches were conducted on samples containing other compounds with concentration in excess of 50 µg/L. Sample spectra were compared to the NBS reference library. Results are shown in the attached Tables.

Chromatograms will be kept on file. Results are not corrected for recovery.

Sincerely,

NOVALAB LIMITED



L.W. Tang, B.Sc.



Approved by J.D. Fenwick, Ph.D., P.Chem.

LWT/hl  
encl.

Table 1Summary of Water Samples Received

| <u>Date<br/>Received</u> | <u>Amount of<br/>Sample</u> | <u>Sample<br/>Identification</u>                 | <u>Analysis<br/>Required</u> |
|--------------------------|-----------------------------|--------------------------------------------------|------------------------------|
| 12/8/88                  | 2                           | Trip Blank *<br>C4                               | Phenolics                    |
|                          | 6                           | Trip Blank *<br>C4<br>A2-1<br>A5<br>A2-2<br>D3-2 | Volatile Pollutants          |
| 15/8/88                  | 2                           | SW1<br>SW1 Trip Blank *                          | Phenolics                    |
|                          | 4                           | SW1<br>SW1 Trip Blank *<br>SW2<br>SW5            | Volatile Pollutants          |
| 1/9/88                   | 3                           | A1-2<br>B1<br>GWTB2 Trip Blank                   | Phenolics                    |
|                          | 4                           | A1-2<br>GWTB2 Trip Blank<br>B1<br>B2-2           | Volatile Pollutants          |
| 6/9/88                   | 2                           | SP-A2<br>SP-P47                                  | Phenolics                    |
|                          | 5                           | SP-A1<br>SP-A2<br>SP-A3<br>SP-P47<br>B2-1        | Volatile Pollutants          |

\* These trip blanks were requested not to be analysed.

Forensic Scan Analysis - Volatiles CompoundsSample : A2-2

| <u>Scan</u> | <u>Time (min)</u> | <u>Identification</u> |
|-------------|-------------------|-----------------------|
| 1319        | 22:00             | $C_9H_8$ CAS 673-32-5 |
| 1506        | 25:07             | Naphthalene           |

Sample : D3-2

| <u>Scan</u> | <u>Time (min)</u> | <u>Identification</u> |
|-------------|-------------------|-----------------------|
| 1504        | 25:05             | Naphthalene           |

Sample : C4

| <u>Scan</u> | <u>Time (min)</u> | <u>Identification</u> |
|-------------|-------------------|-----------------------|
| 1504        | 25:05             | Naphthalene           |

Sample : B1

| <u>Scan</u> | <u>Time (min)</u> | <u>Identification</u>                          |
|-------------|-------------------|------------------------------------------------|
| 1272        | 21:13             | Benzofuran ( $C_8H_6O$ )                       |
| 1332        | 22:13             | $C_9H_8$ CAS 673-32-5                          |
| 1370        | 22:52             | $C_{10}H_{12}$ Isomers                         |
| 1431        | 23:52             |                                                |
| 1449        | 24:10             | Methyl benzofuran<br>CAS 17059-52-8            |
| 1395        | 23:16             | $C_9H_8O$                                      |
| 1401        | 23:22             |                                                |
| 1457        | 24:19             | Butynyl benzene<br>$C_{10}H_{10}$ CAS 622-76-4 |
| 1469        | 24:31             |                                                |
| 1521        | 25:22             | Naphtalene                                     |
| 1529        | 25:31             | Benzothiopene<br>$C_8H_6S$ CAS 95-15-8         |

Forensic Scan Analysis - Volatiles Compounds (cont'd)Sample : A1-2

| <u>Scan</u> | <u>Time (min)</u> | <u>Identification</u>                                               |
|-------------|-------------------|---------------------------------------------------------------------|
| 375         | 6:16              | Acetone                                                             |
| 597         | 9:58              | Methyl ethyl ketone                                                 |
| 1329        | 22:10             | C <sub>9</sub> H <sub>8</sub>                                       |
| 1404        | 23:25             | Methyl benzofuran<br>C <sub>9</sub> H <sub>8</sub> O CAS 17059-52-8 |
| 1455        | 24:15             | Butynyl benzene                                                     |
| 1467        | 24:29             | C <sub>10</sub> H <sub>10</sub> CAS 622-76-4                        |
| 1516        | 25:17             | Naphthalene                                                         |
| 1533        | 25:35             | Benzothiopene<br>C <sub>8</sub> H <sub>6</sub> S CAS 95-15-8        |

Forensic Scan Analysis - Extractable CompoundsSample : A1-2

| <u>Time (min)</u> | <u>Identification</u>                                                                          |
|-------------------|------------------------------------------------------------------------------------------------|
| 11.2              | Benzoic acid                                                                                   |
| 12.1              | Methyl benzoic acid                                                                            |
| 12.3              | C <sub>8</sub> H <sub>8</sub> O <sub>2</sub>                                                   |
| 12.5              | C <sub>7</sub> H <sub>10</sub> O CAS 497-38-1                                                  |
| 13.2              | Methyl benzeneacetic acid<br>C <sub>9</sub> H <sub>10</sub> O <sub>2</sub> CAS 492-37-5        |
| 15.5              | Ar-ethenyl benzeneacetic acid<br>C <sub>10</sub> H <sub>10</sub> O <sub>2</sub> CAS 37570-14-2 |

CONCENTRATION OF ACIDIC PRIORITY POLLUTANTS IN WATER  
ug/L

| COMPOUND                   | A1-2 <sup>±</sup> | B-1 <sup>±</sup> | LAB<br>BLANK | MDL |
|----------------------------|-------------------|------------------|--------------|-----|
| PHENOL                     | 360               | 6                | -            | 2   |
| 2-CHLOROPHENOL             | -                 | -                | -            | 2   |
| 2,4-DIMETHYLPHENOL         | -                 | -                | -            | 10  |
| 4-CHLORO-3-METHYLPHENOL    | -                 | -                | -            | 2   |
| 2,4-DICHLOROPHENOL         | -                 | -                | -            | 2   |
| 2,4,6-TRICHLOROPHENOL      | -                 | -                | -            | 2   |
| 2-NITROPHENOL              | -                 | -                | -            | 4   |
| 2,4-DINITROPHENOL          | -                 | -                | -            | 10  |
| 2-METHYL-4,6-DINITROPHENOL | -                 | -                | -            | 10  |
| 4-NITROPHENOL              | -                 | -                | -            | 10  |
| PENTACHLOROPHENOL          | -                 | -                | -            | 5   |
| 2,6-DICHLOROPHENOL         | -                 | -                | -            | 2   |
| OTHER TRICHLOROPHENOLS     | -                 | -                | -            | 2   |
| TETRACHLOROPHENOLS         | -                 | -                | -            | 5   |
| M+P-CRESOL                 | 88                | -                | -            | 2   |
| O-CRESOL                   | 7.6               | TR               | -            | 2   |
| OTHER DIMETHYL PHENOLS     | 12                | 57               | -            | 10  |
| TRIMETHYL PHENOLS          | -                 | -                | -            | 10  |

MDL = METHOD DETECTION LIMIT

TR = TRACE

<sup>±</sup> Samples were analysed without acetylation.

RECOVERY OF SURROGATE STANDARDS  
(%)

| COMPOUND                 | A1-2 | B-1  | LAB<br>BLANK |
|--------------------------|------|------|--------------|
| D5-PHENOL                | 9.2  | 64.3 | 40           |
| TRIFLUOROMETHYL-M-CRESOL | 54.9 | 83   | 71.5         |



CONCENTRATION OF ACIDIC PRIORITY POLLUTANTS IN WATER

ug/L

| COMPOUND                   | A1-2 | B-1 | TRIP           | LAB   | MDL |
|----------------------------|------|-----|----------------|-------|-----|
|                            |      |     | BLANK<br>GWTB2 | BLANK |     |
| PHENOL                     | 170  | -   | -              | -     | 1   |
| 2-CHLOROPHENOL             | -    | -   | -              | -     | 1   |
| 2,4-DIMETHYLPHENOL         | -    | -   | -              | -     | 1   |
| 4-CHLORO-3-METHYLPHENOL    | -    | -   | -              | -     | 1   |
| 2,4-DICHLOROPHENOL         | -    | -   | -              | -     | 1   |
| 2,4,6-TRICHLOROPHENOL      | -    | -   | -              | -     | 1   |
| 2-NITROPHENOL              | -    | -   | -              | -     | 2   |
| 2,4-DINITROPHENOL          | -    | -   | -              | -     | 100 |
| 2-METHYL-4,6-DINITROPHENOL | -    | -   | -              | -     | 25  |
| 4-NITROPHENOL              | -    | -   | -              | -     | 100 |
| PENTACHLOROPHENOL          | -    | -   | -              | -     | 1   |
| 2,6-DICHLOROPHENOL         | -    | -   | -              | -     | 1   |
| 2,3,4-TRICHLOROPHENOL      | -    | -   | -              | -     | 1   |
| 2,3,5-TRICHLOROPHENOL      | -    | -   | -              | -     | 1   |
| 2,4,5-TRICHLOROPHENOL      | -    | -   | -              | -     | 1   |
| 2,3,4,5-TETRACHLOROPHENOL  | -    | -   | -              | -     | 1   |
| 2,3,4,6-TETRACHLOROPHENOL  | -    | -   | -              | -     | 1   |
| 2,3,5,6-TETRACHLOROPHENOL  | -    | -   | -              | -     | 1   |
| M-CRESOL                   | 28   | -   | -              | -     | 1   |
| P-CRESOL                   | 41   | -   | -              | -     | 1   |
| O-CRESOL                   | 10   | -   | -              | -     | 1   |
| OTHER DIMETHYL PHENOLS     | 22   | 80  | -              | -     | 1   |
| TRIMETHYL PHENOLS          | -    | -   | -              | -     | 1   |

MDL = METHOD DETECTION LIMIT

Note : Samples were in-situ acetylated prior to the extraction.

RECOVERY OF SURROGATE STANDARDS

(%)

| COMPOUND                 | A1-2 | B-1  | TRIP           | LAB   |
|--------------------------|------|------|----------------|-------|
|                          |      |      | BLANK<br>GWTB2 | BLANK |
| DS-PHENOL                | 15.2 | 77.1 | 91.2           | 96.3  |
| TRIFLUOROMETHYL-M-CRESOL | 17.9 | 78   | 94.5           | 100   |

CONCENTRATION OF ACIDIC PRIORITY POLLUTANTS IN WATER  
ug/L

| COMPOUND                   | SP-A2 | SP-P77 | BLANK | MDL |
|----------------------------|-------|--------|-------|-----|
| PHENOL                     | 1     | -      | -     | 1   |
| 2-CHLOROPHENOL             | -     | -      | -     | 1   |
| 2,4-DIMETHYLPHENOL         | -     | -      | -     | 1   |
| 4-CHLORO-3-METHYLPHENOL    | -     | -      | -     | 1   |
| 2,4-DICHLOROPHENOL         | -     | -      | -     | 1   |
| 2,4,6-TRICHLOROPHENOL      | -     | -      | -     | 1   |
| 2-NITROPHENOL              | -     | -      | -     | 2   |
| 2,4-DINITROPHENOL          | -     | -      | -     | 100 |
| 2-METHYL-4,6-DINITROPHENOL | -     | -      | -     | 25  |
| 4-NITROPHENOL              | -     | -      | -     | 100 |
| PENTACHLOROPHENOL          | -     | -      | -     | 1   |
| 2,6-DICHLOROPHENOL         | -     | -      | -     | 1   |
| 2,3,4-TRICHLOROPHENOL      | -     | -      | -     | 1   |
| 2,3,5-TRICHLOROPHENOL      | -     | -      | -     | 1   |
| 2,4,5-TRICHLOROPHENOL      | -     | -      | -     | 1   |
| 2,3,4,5-TETRACHLOROPHENOL  | -     | -      | -     | 1   |
| 2,3,4,6-TETRACHLOROPHENOL  | -     | -      | -     | 1   |
| 2,3,5,6-TETRACHLOROPHENOL  | -     | -      | -     | 1   |
| M-CRESOL                   | -     | -      | -     | 1   |
| P-CRESOL                   | -     | -      | -     | 1   |
| O-CRESOL                   | -     | -      | -     | 1   |
| OTHER DIMETHYL PHENOLS     | -     | -      | -     | 1   |
| TRIMETHYL PHENOLS          | -     | -      | -     | 1   |

MDL = METHOD DETECTION LIMIT

Note : Samples were in-situ acetylated prior to the extraction.

RECOVERY OF SURROGATE STANDARDS  
(%)

| COMPOUND                 | SP-A2 | SP-P77 | BLANK |
|--------------------------|-------|--------|-------|
| D5-PHENOL                | 94.6  | 92.1   | 96.3  |
| TRIFLUOROMETHYL-M-CRESOL | 97    | 97     | 100   |

CONCENTRATION OF ACIDIC PRIORITY POLLUTANTS IN WATER

ug/L

| COMPOUND                   | C4 | BLANK | MDL |
|----------------------------|----|-------|-----|
| PHENOL                     | -  | -     | 1   |
| 2-CHLOROPHENOL             | -  | -     | 1   |
| 2,4-DIMETHYLPHENOL         | -  | -     | 1   |
| 4-CHLORO-3-METHYLPHENOL    | -  | -     | 1   |
| 2,4-DICHLOROPHENOL         | -  | -     | 1   |
| 2,4,6-TRICHLOROPHENOL      | -  | -     | 1   |
| 2-NITROPHENOL              | -  | -     | 2   |
| 2,4-DINITROPHENOL          | -  | -     | 100 |
| 2-METHYL-4,6-DINITROPHENOL | -  | -     | 25  |
| 4-NITROPHENOL              | -  | -     | 100 |
| PENTACHLOROPHENOL          | -  | -     | 1   |
| 2,6-DICHLOROPHENOL         | -  | -     | 1   |
| 2,3,4-TRICHLOROPHENOL      | -  | -     | 1   |
| 2,3,5-TRICHLOROPHENOL      | -  | -     | 1   |
| 2,4,5-TRICHLOROPHENOL      | -  | -     | 1   |
| 2,3,4,5-TETRACHLOROPHENOL  | -  | -     | 1   |
| 2,3,4,6-TETRACHLOROPHENOL  | -  | -     | 1   |
| 2,3,5,6-TETRACHLOROPHENOL  | -  | -     | 1   |
| M-CRESOL                   | -  | -     | 1   |
| P-CRESOL                   | -  | -     | 1   |
| O-CRESOL                   | TR | -     | 1   |
| OTHER DIMETHYL PHENOLS     | 4  | -     | 1   |
| TRIMETHYL PHENOLS          | -  | -     | 1   |

MDL = METHOD DETECTION LIMIT

TR = TRACE

Note : Samples were in-situ acetylated prior to the extraction.

RECOVERY OF SURROGATE STANDARDS  
(%)

| COMPOUND                 | C4  | BLANK |
|--------------------------|-----|-------|
| D5-PHENOL                | 100 | 100   |
| TRIFLUOROMETHYL-M-CRESOL | 100 | 100   |

CONCENTRATION OF VOLATILE PRIORITY POLLUTANTS IN WATER  
ug/L

| COMPOUND                   | A2-1 | A2-2 | A5  | C4  | D3-2 | BLANK | MDL |
|----------------------------|------|------|-----|-----|------|-------|-----|
| BENZENE                    | 4.1  | 130  | -   | 2.4 | -    | -     | 1   |
| BROMODICHLOROMETHANE       | -    | -    | -   | -   | -    | -     | 1   |
| BROMOFORM                  | -    | -    | -   | -   | -    | -     | 2   |
| BROMOMETHANE               | -    | -    | -   | -   | -    | -     | 16  |
| CARBON TETRACHLORIDE       | -    | -    | -   | -   | -    | -     | 2   |
| CHLOROBENZENE              | -    | -    | -   | -   | -    | -     | 1   |
| CHLOROETHANE               | -    | -    | -   | -   | -    | -     | 10  |
| 2-CHLOROETHYL VINYL ETHER  | -    | -    | -   | -   | -    | -     | 10  |
| CHLOROFORM                 | -    | -    | -   | -   | -    | -     | 1   |
| CHLOROMETHANE              | -    | -    | -   | -   | -    | -     | 50  |
| DIBROMOCHLOROMETHANE       | -    | -    | -   | -   | -    | -     | 1   |
| 1,2-DICHLOROBENZENE        | -    | -    | -   | -   | -    | -     | 1   |
| 1,3-DICHLOROBENZENE        | -    | -    | -   | -   | -    | -     | 1   |
| 1,4-DICHLOROBENZENE        | -    | -    | -   | -   | -    | -     | 1   |
| 1,1-DICHLOROETHYLENE       | -    | -    | -   | -   | -    | -     | 1   |
| 1,1-DICHLOROETHANE         | -    | -    | -   | -   | -    | -     | 1   |
| 1,2-DICHLOROETHANE         | -    | -    | -   | -   | -    | -     | 1   |
| TRANS-1,2-DICHLOROETHYLENE | -    | 2.4  | -   | -   | -    | -     | 1   |
| DICHLOROMETHANE            | -    | -    | -   | 23  | 26   | -     | 15  |
| 1,2-DICHLOROPROPANE        | -    | -    | -   | -   | -    | -     | 1   |
| CIS-1,3-DICHLOROPROPENE    | -    | -    | -   | -   | -    | -     | 1   |
| TRANS-1,3-DICHLOROPROPENE  | -    | -    | -   | -   | -    | -     | 1   |
| ETHYLBENZENE               | -    | 3.3  | -   | -   | -    | -     | 1   |
| A-METHYLSTYRENE            | -    | -    | -   | -   | -    | -     | 1   |
| METHYLSTYRENE ISOMERS      | -    | -    | -   | -   | -    | -     | 1   |
| MESITYLENE                 | -    | -    | -   | -   | -    | -     | 1   |
| 1,1,2,2-TETRACHLOROETHANE  | -    | -    | -   | -   | -    | -     | 1   |
| TETRACHLOROETHYLENE        | -    | 1.9  | 3   | 1.3 | 2.4  | -     | 2   |
| TOLUENE                    | 19   | 4.8  | 4.8 | 6.1 | -    | -     | 1   |
| 1,1,1-TRICHLOROETHANE      | -    | -    | -   | -   | -    | -     | 2   |
| 1,1,2-TRICHLOROETHANE      | -    | -    | -   | -   | -    | -     | 2   |
| TRICHLOROETHYLENE          | 1.3  | 20   | -   | -   | -    | -     | 1   |
| TRICHLOROFLUOROMETHANE     | -    | 3.3  | -   | -   | -    | -     | 1   |
| M+P-XYLENE                 | -    | 5.9  | -   | TR  | -    | -     | 2   |
| O-XYLENE                   | -    | 7.8  | -   | 1.5 | -    | -     | 2   |
| VINYL CHLORIDE             | -    | -    | -   | -   | -    | -     | 1   |
| METHYL ETHYL KETONE        | -    | -    | -   | -   | -    | -     | 12  |
| CUMEN                      | -    | -    | -   | -   | -    | -     | 20  |
| PROPYL BENZENE             | -    | -    | -   | -   | -    | -     | 1   |
| M+P-ETHYL TOLUENE          | -    | TR   | -   | 1.2 | -    | -     | 1   |
| O-ETHYL TOLUENE            | -    | 1    | -   | 2.5 | -    | -     | 1   |
| DIBROMOETHANE              | -    | -    | -   | -   | -    | -     | 1   |
| CIS-1,2-DICHLOROETHYLENE   | 1.8  | 41   | -   | -   | -    | -     | 5   |
| STYRENE                    | -    | 2.7  | -   | -   | -    | -     | 1   |
| OTHER AROMATIC COMPOUNDS   | -    | 11   | -   | 24  | -    | -     | 2   |
|                            |      |      |     |     |      |       | 1   |

MDL = METHOD DETECTION LIMITS

TR - TRACE

OTHER AROMATIC COMPOUNDS = Total concentration of trimethylbenzenes  
using the response factor of mesitylene.

CONCENTRATION OF VOLATILE PRIORITY POLLUTANTS IN WATER  
ug/L

| COMPOUND                   | SP-A1 | SP-A2 | SP-A3 | SP-P47 | B2-1 | BLANK | MDL |
|----------------------------|-------|-------|-------|--------|------|-------|-----|
| BENZENE                    | -     | -     | -     | -      | -    | -     | 1   |
| BROMODICHLOROMETHANE       | -     | -     | -     | -      | -    | -     | 1   |
| BROMOPORM                  | -     | -     | -     | -      | -    | -     | 2   |
| BROMOMETHANE               | -     | -     | -     | -      | -    | -     | 16  |
| CARBON TETRACHLORIDE       | -     | -     | -     | -      | -    | -     | 2   |
| CHLOROETHANE               | -     | -     | -     | -      | -    | -     | 1   |
| 2-CHLOROETHYL VINYL ETHER  | -     | -     | -     | -      | -    | -     | 10  |
| CHLOROPORM                 | -     | -     | -     | -      | -    | -     | 10  |
| CHLOROMETHANE              | -     | -     | -     | -      | -    | -     | 1   |
| DIBROMOCHLOROMETHANE       | -     | -     | -     | -      | -    | -     | 50  |
| 1,2-DICHLOROBENZENE        | -     | -     | -     | -      | -    | -     | 1   |
| 1,3-DICHLOROBENZENE        | -     | -     | -     | -      | -    | -     | 1   |
| 1,4-DICHLOROBENZENE        | -     | -     | -     | -      | -    | -     | 1   |
| 1,1-DICHLOROETHYLENE       | -     | -     | -     | -      | -    | -     | 1   |
| 1,1-DICHLOROETHANE         | -     | -     | -     | -      | -    | -     | 1   |
| 1,2-DICHLOROETHANE         | -     | -     | -     | -      | -    | -     | 1   |
| TRANS-1,2-DICHLOROETHYLENE | -     | -     | -     | -      | -    | -     | 2   |
| DICHLOROMETHANE            | -     | -     | -     | -      | -    | -     | 1   |
| 1,2-DICHLOROPROPANE        | -     | -     | -     | -      | 32   | -     | 10  |
| CIS-1,3-DICHLOROPROPENE    | -     | -     | -     | -      | -    | -     | 1   |
| TRANS-1,3-DICHLOROPROPENE  | -     | -     | -     | -      | -    | -     | 1   |
| ETHYLBENZENE               | -     | -     | -     | -      | -    | -     | 1   |
| A-METHYLSTYRENE            | -     | -     | -     | -      | -    | -     | 1   |
| METHYLSTYRENE ISOMERS      | -     | -     | -     | -      | -    | -     | 1   |
| MESITYLENE                 | -     | -     | -     | -      | -    | -     | 1   |
| 1,1,2,2-TETRACHLOROETHANE  | -     | -     | -     | -      | -    | -     | 1   |
| TETRACHLOROETHYLENE        | -     | -     | -     | -      | -    | -     | 2   |
| TOLUENE                    | -     | -     | -     | -      | -    | -     | 1   |
| 1,1,1-TRICHLOROETHANE      | -     | -     | -     | -      | -    | -     | 2   |
| 1,1,2-TRICHLOROETHANE      | -     | -     | -     | -      | -    | -     | 2   |
| TRICHLOROETHYLENE          | -     | -     | -     | -      | -    | -     | 1   |
| TRICHLOROFLUOROMETHANE     | -     | -     | -     | -      | -    | -     | 1   |
| M+P-XYLENE                 | -     | -     | -     | 2.1    | 7.1  | -     | 2   |
| O-XYLENE                   | -     | -     | -     | -      | -    | -     | 2   |
| VINYL CHLORIDE             | -     | -     | -     | -      | -    | -     | 1   |
| METHYLETHYL KETONE         | -     | -     | -     | -      | -    | -     | 12  |
| CUMEN                      | -     | -     | -     | -      | -    | -     | 20  |
| M+P-ETHYL TOLUENE          | -     | -     | -     | -      | -    | -     | 1   |
| O-ETHYL TOLUENE            | -     | -     | -     | -      | -    | -     | 1   |
| DIBROMOETHANE              | -     | -     | -     | -      | -    | -     | 1   |
| STYRENE                    | -     | -     | -     | -      | -    | -     | 5   |
| OTHER AROMATIC COMPOUNDS   | -     | -     | -     | -      | -    | -     | 2   |
|                            |       |       |       |        |      |       | 1   |

MDL = METHOD DETECTION LIMITS

OTHER AROMATIC COMPOUNDS = Total concentration of trimethylbenzenes  
using the response factor of mesitylene.

**QA/QC RESULTS - SUMMER 1988**

## **ANALYTICAL QUALITY ASSURANCE/QUALITY CONTROL**

### **A1.0 INTRODUCTION**

Environmental questions related to the potential release of contaminants from the slag disposal site of Algoma Steel at Sault Ste. Marie require high quality analytical data. This document presents a brief summary of the Quality Assurance/Quality Control (QA/QC) program in effect at Beak Analytical Services (BAS) and QC results specific to the Algoma project. As a source for many of its QA/QC policies, BEAK has relied heavily on such documents as EPA's Handbook for Analytical Quality Control in Water and Wastewater Laboratories (EPA-600/4-79-019) and numerous QA/QC publications produced by the Ontario Ministry of the Environment.

#### **A1.1 Format**

The QA/QC policies employed by BAS in the handling and analysis of Algoma samples are discussed under the separate categories listed below:

1. Chain of Custody Procedure/Sample Handling
2. Quality Assurance Procedures
3. Quality Control Procedures
4. Corrective Action
5. Performance Evaluation Audits

### **A2.0 CHAIN-OF-CUSTODY PROCEDURES AND SAMPLE HANDLING**

Since the results of chemical analyses are often used to support litigation, the chain-of-custody of both samples and results is strictly controlled and documented. Following U.S. EPA guidelines, one person, Ms. Karen Kaufman, is assigned the job of laboratory sample custodian and assumes custody of the samples on behalf of the laboratory.

The samples are preserved, if necessary, then logged into a computerized Laboratory Information Management System (LIMS). During log-in, each sample is assigned a unique, sequential identification number which is affixed to each sample. The laboratory custodian also enters the person delivering the samples, the date and time of their

receipt, the source of the sample (client), the type of sample, the condition of the sample, the parameters to be measured, whether the sample has been preserved and the sample storage location. The LIMS then generates an analysis sheet to be used at the laboratory bench. Samples are stored in the assigned location in the fridge or sample storage area. These areas, and indeed the laboratory itself, are accessible only to authorized personnel. Priority analyses such as pH are performed upon receipt of the samples.

The laboratory supervisor assigns the priority and the analyst to each analysis. The analyst conducts the analysis and submits the results for entering into the LIMS. The raw data for each analysis are recorded in each analyst's bound notebook or in a parameter workbook. The LIMS generates a final report for the client. Final results, including the quality control data, are reviewed by the quality control officer or laboratory supervisor who authorizes release of the data to the project manager.

Once the sample analyses are completed, the unused portion of the sample, together with all identifying labels, are returned to the sample storage area. The returned samples are retained until permission to destroy the sample is received from the project manager or client, or the recommended maximum holding time has lapsed.

### **A3.0     QUALITY ASSURANCE PROCEDURES**

In this section are briefly discussed measures and procedures taken at BEAK to ensure the high quality of results submitted to clients. Most of these measures are discussed in EPA (1979) and other QA/QC documents.

#### **A3.1     Analytical Methods**

All analytical methods used at BAS are clearly referenced, and are either identical, or very similar, to methods produced by standard-setting organizations such as the U.S. EPA, the Ontario Ministry of the Environment (MOE), APHA (Standard Methods) and Environment Canada. Any modifications to these methods such as changes in scale or concentrations are recorded in BEAK's Methods Manual.



### A3.1.2 Methods Specific to Algoma Samples

#### Inorganic Parameters

Methods of inorganic analysis specific to the Algoma project are presented in Table A1. Dissolved inorganic carbon (DIC) and dissolved organic carbon (DOC) were analyzed colorimetrically (phenolphthalein indicator) on a Technicon auto analyzer. Alkalinity was measured titrimetrically on a Radiometer VIT90 auto titrator. Phenols were determined colorimetrically on a Technicon auto analyzer using the potassium ferricyanide method. Sulphides were determined by the methylene-blue technique (Standard Methods). Total cyanide was determined colorimetrically (manual method) with chloramine T and pyridine-pyrazolone after acid distillation. Total phosphorus was determined colorimetrically (molybdate reaction) on a Technicon auto analyzer after acid digestion. Bromide, fluoride, sulphate and nitrate were determined by ion chromatography (Dionex 2000I). Ammonia was analyzed colorimetrically (nitroprusside method) on a Technicon IV auto analyzer. Total Kjeldahl nitrogen was determined colorimetrically (salicylate-nitroprusside-hypochlorite) on a Technicon IV auto analyzer after acidic digestion.

All metals in waters, leachates and soil extracts were analyzed by direct current plasma emission spectrometry (DCP, Beckman Spectrospan V), with the exception of cadmium, arsenic, selenium and mercury. Cadmium was analyzed by Zeeman corrected graphite furnace atomic absorption spectrometry (GFAAS, Perkin Elmer 3030). Arsenic and selenium concentrations were measured by hydride generation on a dedicated Perkin Elmer 303 atomic absorption spectrophotometer (Standard Methods, 1985). Mercury was determined by cold vapour flameless atomic absorption spectrometry (Hames, 1983). Soils and sediments were analyzed for metals by digesting approximately 0.5 g at 100°C for 12 hours in 10 mL of aqua regia and diluting to 25 mL.

Conductivity and pH determinations on soils were made on a distilled water slurry (1:1). Other dissolved components in soils (Br, Cl, F, NO<sub>3</sub>, etc.) were measured on a (1:20) suspension of the soil with distilled deionized water. Three types of soil leachates were run, an Ontario Regulation 309, an alkaline leachate using 0.5N NaOH (pH 10±0.2) and an acidic leachate using 0.5N HCl (pH 5±0.2).

TABLE A1: METHOD OF ANALYSIS OF INORGANIC PARAMETERS

| Parameter                | Matrix              | Analysis                                   |
|--------------------------|---------------------|--------------------------------------------|
| pH                       | water <sup>1</sup>  | pH meter                                   |
| Alkalinity               | water               | titrametric-Radiometer VIT90 autotitrator  |
| Dissolved Organic Carbon | water               | colormetric (automated-Technicon 4)        |
| Phenols                  | water               | colormetric (automated-Technicon 4)        |
| Loss-on-Ignition         | sediment/soil       | gravimetric                                |
| Cyanide                  | water               | colormetric-pyridine-pyrazolone manual     |
| Bromide                  | water               | ion chromatography (Dionex 2000I)          |
| Nitrate                  | water               | ion chromatography (Dionex 2000I)          |
| Chloride                 | water               | ion chromatography (Dionex 2000I)          |
| Fluoride                 | water               | ion chromatography (Dionex 2000I)          |
| Sulphate                 | water               | ion chromatography (Dionex 2000I)          |
| Ammonia                  | water               | colorimetric (automated-Technicon IV)      |
| Total Kjeldahl Nitrogen  | water/sediment/soil | colourimetric (automated-Technicon IV)     |
| Total Phosphorus         | water/sediment/soil | colourimetric (automated-Technicon IV)/DCP |
| Zinc                     | water/sediment/soil | DCP                                        |
| Cadmium                  | water/sediment/soil | DCP/graphite furnace AA                    |
| Manganese                | water/sediment/soil | DCP                                        |
| Cobalt                   | water/sediment/soil | DCP                                        |
| Copper                   | water/sediment/soil | DCP                                        |
| Iron                     | water/sediment/soil | DCP                                        |

TABLE A1: METHOD OF ANALYSIS OF INORGANIC PARAMETERS

| Parameter  | Matrix              | Analysis                               |
|------------|---------------------|----------------------------------------|
| Lead       | water/sediment/soil | DCP                                    |
| Chromium   | water/sediment/soil | DCP                                    |
| Nickel     | water/sediment/soil | DCP                                    |
| Beryllium  | water/sediment/soil | DCP                                    |
| Molybdenum | water/sediment/soil | DCP                                    |
| Calcium    | water/sediment/soil | DCP                                    |
| Vanadium   | water/sediment/soil | DCP                                    |
| Aluminum   | water/sediment/soil | DCP                                    |
| Magnesium  | water/sediment/soil | DCP                                    |
| Barium     | water/sediment/soil | DCP                                    |
| Potassium  | water/sediment/soil | DCP                                    |
| Strontium  | water/sediment/soil | DCP                                    |
| Sodium     | water/sediment/soil | DCP                                    |
| Mercury    | water               | atomic absorption - cold vapour        |
| Arsenic    | water               | atomic absorption - hydride generation |
| Se         | water               | atomic absorption - hydride generation |

<sup>1</sup> includes leachates, seepage water and groundwater

## Organic Parameters

Oil and grease was determined gravimetrically after extraction with dichloromethane. PCBs were analyzed by dual capillary GC/ECD. PAHs were analyzed by GC/MS (Hewlett Packard). Halogenated volatiles and non-halogenated volatiles were analyzed by a subcontractor, Novalab Inc., by purge and trap (Unacon) and GC/MS (Finnigan Ion Trap Detector). Phenolics, also analyzed by Novalab, were run on a GC/MS system (Hewlett Packard) after in situ acetylation.

### **A3.2 Sampling Containers and Preservation**

Selection of sample containers and sample preservation followed established QA/QC protocols. Sediment samples were collected in new, solvent-rinsed glass jars with foil-lined caps. Water samples for general chemical parameters were collected in new 50 mL high-density polyethylene bottles. Samples for trace metals were collected in new 250 mL bottles of the same material after being soaked in acid for 24 hours and rinsed in distilled deionized water at least three times. Samples for trace metals were preserved in the field with "ultra" grade nitric acid. Separate samples were taken for mercury and were preserved with "ultra" grade nitric acid (1%) and potassium dichromate (5%). A summary of the sampling containers and the preservatives used are presented in Table A2. Samples received were stored in an assigned location in the refrigerator at 4°C.

#### **A3.2.1 Certification of Sampling Bottles**

Checks are frequently run on sampling bottles as potential sources of contamination, especially in the analysis of trace metals. Sample bottles are tested by filling them with distilled, deionized water, adding the chemical preservative and allowing them to stand for periods of time up to three months. The results of these tests (Table A3) indicate that, within detection limits, BAS sampling bottles do not present a source of contamination to environmental samples.

#### **A3.2.2 Reagents and Reagent Solutions**

One of the major sources of anomalous results outside the limits of random error is contaminated reagents, or reagents which have been incorrectly prepared. Preventing

TABLE A2: BOTTLE TYPES AND PRESERVATIVES USED FOR ALGOMA SAMPLES

| Bottle Type          | Chemical Parameters | Preservative             |
|----------------------|---------------------|--------------------------|
| 500 mL polyethylene  | wet chemical        | none                     |
| 500 mL polyethylene  | cyanide             | sodium hydroxide         |
| 250 mL polyethylene  | metals              | nitric acid              |
| 100 mL amber glass   | mercury             | nitric acid + dichromate |
| 250 mL amber glass   | oil and grease      | sulphuric acid           |
| 250 mL amber glass   | phenol              | copper sulphate          |
| 100 mL amber glass   | sulphide            | zinc acetate             |
| 1,000 mL amber glass | PAH                 | none                     |
| 100 mL glass         | volatiles           | sodium thiosulphate      |
| 1,000 mL amber glass | phenolic species    | none                     |

TABLE A3: BOTTLE CERTIFICATION TESTS ON TWO LOTS OF SAMPLING  
BOTTLES FOR TRACE METALS (ug/L)

| Parameter | Lot 1 |       | Lot 2  |        | Three-Month<br>Test |
|-----------|-------|-------|--------|--------|---------------------|
|           | No. 1 | No. 2 | No. 1  | No. 2  |                     |
| Zinc      | L 5   | L 5   | L 5    | L 5    | L 5                 |
| Cadmium   | L 0.1 | L 0.1 | L 0.1  | L 0.1  | L 0.1               |
| Copper    | 0.5   | L 0.5 | L 0.5  | L 0.5  | -                   |
| Lead      | L 1   | L 1   | L 0.5  | L 0.5  | L 0.5               |
| Chromium  | -     | -     | L 1    | L 1    | -                   |
| Nickel    | -     | -     | L 1    | L 1    | -                   |
| Aluminum  | L 5   | L 5   | L 5    | L 5    | -                   |
| Mercury   | -     | -     | L 0.05 | L 0.05 | -                   |
| Silver    | -     | -     | L 0.1  | L 0.1  | -                   |

these errors has become a major objective of our quality assurance program. All standards and reagents are prepared with chemicals which meet the American Chemical Society "analytical reagent grade" standards. Special reagents are utilized for procedures requiring higher purity, such as "ultra grade" nitric acid in trace metals work. Purchased reagents are labelled with the date the bottle was opened. Reagents are not used past their date of expiration. Reagent solutions prepared in the laboratory are labelled with the date of preparation, the analyst who prepared the solution, the concentrations of active ingredients and an expiration date. Every effort is made to avoid contamination of reagents.

#### A3.2.3 Laboratory Water

The water used in preparation of reagents and in rinsing of glassware conforms to Type I water described in EPA (1979).

#### A3.2.4 Quality Control Procedure

##### Field Quality Control

Field duplicates and trip blanks were taken at a total frequency of 10% at all sampling levels as part of a field quality control program. The duplicate samples provide an estimate of "field precision" or sampling variability. The trip blanks consist of a sample bottle filled with distilled-deionized water taken to the field and preserved in the field as a normal sample. The trip blanks indicate problems of contamination that occur during the sampling/preserving process and normal sample handling.

Duplicate analyses of the groundwater (Sample D1-2), surface waters (SW-3) and sediments (B10-25) indicate that, while results from duplicate analyses generally correspond closely, greater variability exists between field duplicates than between laboratory replicates (Table A4). For example, the halogens chloride and fluoride and sulphate differed by 15 to 50% in D1-2, while laboratory replicates differ generally by less than 5% at these levels (Section A4.2). A large discrepancy in naphthalene is noted in B10-25. Certain trace metal analyses such as cadmium in D1-2 differed significantly as well. These significant differences between duplicates suggest either that the samples are heterogeneous or that some erratic source of contamination exists in the sampling procedure, sample bottles or preservatives.

TABLE A4: SUMMARY OF FIELD DUPLICATES

| Sample No.<br>Matrix | SW-3<br>Seepage<br>Water <sup>1</sup><br>(mg/L) | B10-25<br>Sediment <sup>2</sup><br>(ug/g) | D1-2<br>Groundwater <sup>2</sup><br>(mg/L) |
|----------------------|-------------------------------------------------|-------------------------------------------|--------------------------------------------|
| Zn                   | 0.04/0.04                                       | 755/730                                   | 0.01/0.01                                  |
| Cd                   | 0.0002/0.0008                                   | 0.95/0.90                                 | 0.0014/0.004                               |
| Mn                   | 0.09/0.09                                       | 14,100/12,200                             | 0.01/L 0.01                                |
| Co                   | L 0.01/L 0.01                                   | 18/16                                     | 0.02/0.02                                  |
| Cu                   | L 0.005/L 0.005                                 | 57/54                                     | 0.010/L 0.005                              |
| Fe                   | 0.98/0.98                                       | 9,500/8,700                               | L 0.02/L 0.02                              |
| Pb                   | L 0.05/L 0.05                                   | 191/173                                   | L 0.05/L 0.05                              |
| Cr                   | L 0.01/L 0.01                                   | 245/220                                   | 0.02/0.02                                  |
| Ni                   | L 0.01/L 0.01                                   | 39/36                                     | 0.02/0.01                                  |
| Be                   |                                                 | 2/2                                       |                                            |
| Mo                   |                                                 | 8/8                                       |                                            |
| Ca                   |                                                 | 56,000/50,000                             |                                            |
| V                    |                                                 | 123/115                                   |                                            |
| Al                   |                                                 | 14,100/14,600                             |                                            |
| Mg                   |                                                 | 15,600/13,700                             |                                            |
| Br                   |                                                 | 84/89                                     |                                            |
| K                    |                                                 | 1,765/1,920                               |                                            |
| Sr                   |                                                 | 70/71                                     |                                            |
| Nr                   |                                                 | 1,595/1,510                               |                                            |
| Bromide              | L 0.1/L 0.1                                     |                                           | L 1/L 1                                    |
| Chloride             | 9.8/21                                          |                                           | 230/200                                    |
| Fluoride             | 0.08/0.08                                       |                                           | 0.50/0.75                                  |
| Sulphide             | 11.3/11.6                                       |                                           |                                            |
| Sulphate             |                                                 |                                           | 115/98                                     |
| NH <sub>3</sub> -N   |                                                 | 23/29                                     |                                            |
| NO <sub>3</sub> -N   | 0.54/0.56                                       |                                           | L 0.5/L 0.5                                |
| TKN                  |                                                 | 1,140/1,320                               |                                            |
| TP                   |                                                 | 700/720                                   |                                            |
| DOC                  | 4.0/4.0                                         |                                           | 9.0/8.5                                    |
| CN                   |                                                 |                                           |                                            |
| Oil and Grease       | L 1.0/L 3.0                                     | 6,200/5,400                               | 2/1                                        |
| PCBs                 |                                                 |                                           |                                            |
| Phenols              | 0.004/0.011                                     | 1.2/1.1                                   | 0.007/0.008                                |
| Conductivity (uS/cm) |                                                 | 400/391                                   | 1,600/1,600                                |
| LOI (%)              | -                                               | 12.5/10.2                                 |                                            |
| Naphthalene          |                                                 | 46/115                                    |                                            |
| Acenaphthylene       |                                                 | 4.5/4.8                                   |                                            |
| Acenaphthene         |                                                 | 3.1/3.5                                   |                                            |
| Flourene             |                                                 | 8.5/8.3                                   |                                            |
| Phenanthrene         |                                                 | 2.4/27                                    |                                            |
| Anthracene           |                                                 | 14.0/12.3                                 |                                            |



TABLE A4: SUMMARY OF FIELD DUPLICATES

| Sample No.              | SW-3<br>Seepage<br>Water <sup>1</sup><br>(mg/L) | B10-25<br>Sediment <sup>2</sup><br>(ug/g) | D1-2<br>Groundwater <sup>2</sup><br>(mg/L) |
|-------------------------|-------------------------------------------------|-------------------------------------------|--------------------------------------------|
| Matrix                  |                                                 |                                           |                                            |
| Fluoranthene            |                                                 | 15.1/16.4                                 |                                            |
| Pyrene                  |                                                 | 11.6/12.8                                 |                                            |
| Benzo(a)anthracene      |                                                 | 8.9/10.4                                  |                                            |
| Chrysene                |                                                 | 8.7/9.9                                   |                                            |
| Benzo(b)fluoranthene    |                                                 | 10.1/12.6                                 |                                            |
| Benzo(k)fluoranthene    |                                                 | 5.9/6.7                                   |                                            |
| Benzo(a)pyrene          |                                                 | 12.5/14.8                                 |                                            |
| Perylene                |                                                 | 4.8/5.9                                   |                                            |
| Indeno(1,2,3-c,d)pyrene |                                                 | 10.5/12.7                                 |                                            |
| Dibenzo(a,h)anthracene  |                                                 | 3.2/4.3                                   |                                            |
| Benzo(g,h,i)perylene    |                                                 | 8.7/10.4                                  |                                            |
| Total PAHs              |                                                 | 178.5/287.8                               |                                            |

<sup>1</sup> All units mg/L unless indicated otherwise.

<sup>2</sup> All units ug/g unless indicated otherwise.

Analysis of the trip blanks for inorganics, PAHs and phenol species in groundwater (see Appendix 2 for the data) indicate that only a few parameters were above limits of detection. These include DIC, phenols, oil and grease, iron and naphthalene. In all cases, the levels obtained are only marginally greater than the detection limits and orders of magnitude less than levels in most of the samples. These results suggest that the sampling and preserving procedures are not significant sources of contamination to real samples. The significant differences between field duplicates, therefore, are probably the results of sample heterogeneity.

#### A4.0 LABORATORY QUALITY CONTROL PROCEDURES

At BEAK Analytical Services (BAS), calibration, precision and accuracy during each analysis are controlled by:

- o calibration control standards,
- o in-run duplicates,
- o control standards,
- o recovery checks (spiking), and
- o performance evaluation audits.

These are discussed under separate sections below.

##### A4.1 Calibration Control

Following procedures promoted by the Ontario Ministry of the Environment, calibration is confirmed by means of two control standards A and B and a long-term blank which is made up and maintained independently of the calibration standards. The system is not calibrated with these solutions. The calibration control standards A and B are chosen to be about 70% and 20% of full-scale, respectively. The sums (A+B) and differences (A-B) are plotted versus time on a control chart and used immediately by the technician to determine whether the calibration process is in control. The warning and control limits are calculated from the standard deviation of the difference (MOE, 1976). Significant changes in sum (A+B) or difference (A-B) between runs indicates a change in slope or intercept, respectively. Examples of control charts for A-B and A+B are provided at the end of this appendix. An analytical run does not proceed unless statistical control of calibration is demonstrated.

#### A4.2 Control of Precision

The precision of each analysis at BAS is controlled by within-run duplicates of samples which are run at a frequency of 10%. Duplicate samples are completely separate samples subjected to the entire analytical procedure. The differences between duplicates are accumulated and sorted according to sample concentration ranges. For each range, control limits are calculated for the differences from the Shewhart formula:

$$UCL = 3.267 \times \bar{R} \text{ (ASTM, STP 15D)}$$

where UCL is the upper control limit and  $\bar{R}$  is the mean difference between replicates. In general, except at the lower end of the scale, duplicate results should differ by less than 5%. Examples of control charts for differences between duplicates for selected Algoma parameters are found following. Individual results of duplicate analyses are found in the data tables.

Duplicate results are also used to calculate the precision of the analysis for each concentration range. Precision is calculated as the coefficient of variation (standard deviation/mean) where the standard deviation is calculated from the formula:

$$\sqrt{D^2/2K}$$

where D is the difference between duplicates and K is the number of duplicate pairs.

Estimates of precision are presented separately for sediment and water matrices in Tables A5 and A6. The applicable concentration range is indicated for each estimate. As to be expected for some analyses (for example, nickel in water), the coefficient of variation can be as high as 25 to 50% close to the detection limit of the analysis.

##### A4.2.1 Detection Limits

As in many laboratories, BAS has traditionally reported detection limits which are based on a signal to noise ratio of 2.5. Concentrations less than these limits were reported as "less than" values. BAS is currently in the process of revising its determination of detection limits to be consistent with U.S. EPA and Ontario Ministry of the Environment

TABLE A5: ESTIMATES OF ANALYTICAL PRECISION FOR SELECTED WATER ANALYSES CALCULATED FROM REPLICATE DATA

| Parameter | Analytical Method | Concentration Range | Precision as Coefficient of Variation (%) |
|-----------|-------------------|---------------------|-------------------------------------------|
| Zn        | DCP               | L 0.05              | 9.9                                       |
|           |                   | 0.05-1.0            | 6.3                                       |
|           |                   | GT 1.0              | 3.4                                       |
| Cd        | GFAAS             | L 0.001             | 17.0                                      |
|           |                   | 0.001-0.0025        | 8.7                                       |
|           |                   | GT 0.0025           | 4.1                                       |
| Mn        | DCP               | L 0.1               | 15.0                                      |
|           |                   | 0.1-1.0             | 3.6                                       |
|           |                   | GT 1.0              | 2.1                                       |
| Cr        | DCP               | L 0.05              | 29.0                                      |
|           |                   | 0.05-1.0            | 6.7                                       |
| Ni        | DCP               | L 0.05              | 11.5                                      |
|           |                   | 0.05-1.0            | 9.1                                       |
| Cu        | DCP               | 1-20                | 2.9                                       |
|           |                   | 20-50               | 4.0                                       |
|           |                   | 50-100              | 1.6                                       |
| Al        | DCP               | 0.05-1.0            | 35.7                                      |
|           |                   | 1.0-5.0             | 7.4                                       |
|           |                   | 5.0-20              | 6.9                                       |
| Mg        | DCP               | 0.05-20             | 4.2                                       |
|           |                   | 20-50               | 1.3                                       |
| K         | DCP               | 1-5                 | 5.6                                       |
|           |                   | 5-12.5              | 5.4                                       |
|           |                   | 12.5-25             | 4.2                                       |
| Na        | DCP               | 0.5-20              | 5.4                                       |
|           |                   | 20-50               | 2.4                                       |
|           |                   | 50-100              | 2.5                                       |
| Hg        | Cold Vapour A.A.  | L 0.0005            | 27.3                                      |
|           |                   | 0.0005-0.001        | 12.1                                      |
|           |                   | GT 0.001            | 11.2                                      |

TABLE A5: ESTIMATES OF ANALYTICAL PRECISION FOR SELECTED WATER ANALYSES CALCULATED FROM REPLICATE DATA

| Parameter          | Analytical Method  | Concentration Range    | Precision as Coefficient of Variation (%) |
|--------------------|--------------------|------------------------|-------------------------------------------|
| As                 |                    | L 0.010<br>GT 0.025    | 10.7<br>9.3                               |
| Se                 | Hydride Generation | L 0.001<br>0.001-0.002 | 42.3<br>23.3                              |
| Conductivity       | Conductivity Meter | 0-100 uS/cm            | 2.0                                       |
| NH <sub>3</sub> -N | Technicon 2        | 0.010-0.070            | 10.8                                      |
| NO <sub>3</sub> -N | Ion Chromatography | 0.01-0.23<br>0.23-0.56 | 11.5<br>5.9                               |
| Cl                 | Ion Chromatography | 0-10<br>10-50          | 1.32<br>2.4                               |
| SO <sub>4</sub>    | Ion Chromatography | 5-19                   | 0.8                                       |

\* Provisional, based on only 3 to 5 points.

L = less than.

GT = greater than.

TABLE A6: ESTIMATES OF ANALYTICAL PRECISION FOR SELECTED SEDIMENT ANALYSES CALCULATED FROM REPLICATE DATA

| Parameter | Analytical Method  | Concentration Range (ug/g) | Precision as Coefficient of Variation (%) |
|-----------|--------------------|----------------------------|-------------------------------------------|
| Zn        | DCP                | L 50                       | 3.6                                       |
| Cr        | DCP                | L 50                       | 3.6                                       |
|           |                    | 50-100                     | 4.5                                       |
|           |                    | GT 100                     | 6.0                                       |
| Ni        | DCP                | L 15                       | 8                                         |
|           |                    | 15-20                      | 3.7                                       |
|           |                    | GT 50                      | 1.17                                      |
| Al        | DCP                |                            |                                           |
| Hg        | Cold Vapour A.A.   | L 0.5                      | 27.3                                      |
|           |                    | L 10                       | 11.3                                      |
| As        | Hydride Generation | 10-25                      | 10.0                                      |
| Se        | Hydride Generation | L 1                        | 42.3                                      |
|           |                    | 1-2                        | 23.3                                      |

N.A. - Data not available.

L - less than.

GT - greater than.

regulations. These regulatory bodies advocate calculation of a method detection limit based on the standard deviation of within-run replicates and Students-t. A detection limit calculated in this way corresponds to the criterion of detection which is defined as the concentration at which the probability is 5% of reporting an analyte which is not really present (ASTM, 1985). Table A7 presents detection limits in water reported at BAS by both methods. In general, detection limits reported in this study were based on the traditional signal to noise ratio. In future samplings, statistically determined method detection limits will be provided based on the variability of replicates at the lower end of the concentration scale.

#### A4.3 Accuracy

BAS uses standard reference materials whenever available as a check on the accuracy of each analytical run. Many of these are certified reference materials obtained from the U.S. EPA, the National Bureau of Standards, or the National Research Council. BAS is also developing its own low-level standards. Internal reference standards have been established for a variety of water parameters, including nitrite, nitrate, total phosphorus, chromium and copper.

Tables A8 and A9 present the results for analyzing standard reference materials for both sediment and water. When available, control limits, based on our historic data, are also included in the table to demonstrate that accuracy was under control during analysis of Algoma samples. Examples of control charts with warning limits set at  $\pm$  two standard deviations and control limits set at  $\pm$  three standard deviations are presented in the figures following.

#### A4.4 Recovery Checks

In methods where digestion and extractions are required, recovery checks or spikes are used to estimate the efficiency of the analysis. The percent recovery is estimated as:

$$\% \text{ Recovery} = \frac{\text{Measured Value}}{\text{Theoretical Value}}$$

In inorganic analyses, recoveries of less than 85% and greater than 115% are deemed unacceptable and appropriate corrective action is taken. In organic analyses, spiking is

TABLE A7: DETECTION LIMITS FOR SELECTED ALGOMA PARAMETERS BASED ON SIGNAL TO NOISE RATIO AND EPA's MDL's

| Parameter       | Matrix <sup>1</sup> | Signal:<br>Noise       | MDL    |
|-----------------|---------------------|------------------------|--------|
| Conductivity    | W                   | 1.0 umhos/cm           | 0.265  |
| NO <sub>3</sub> | W                   | 0.02 mg/L              | 0.011  |
| NH <sub>4</sub> | W                   | 0.005 mg/L             | 0.0135 |
| TP              | W                   | 0.002 mg/L             | 0.0014 |
| Cyanide         | W                   | 0.002 mg/L             | 0.064  |
| TKN             | W                   | 0.05 mg/L              | 0.194  |
| DOC             | W                   | 0.5 mg/L               | 0.114  |
| Be (DCP)        | W                   | 10 ug/L                | 5.4    |
| Co (DCP)        | W                   | 10 ug/L                | 8.6    |
| Mo (DCP)        | W                   | 20 ug/L                | 4.8    |
| V (DCP)         | W                   | 10 ug/L                | 4.7    |
| As              | W<br>S              | 1 ug/L<br>0.5 ug/g     | 2.46   |
| Cu              | W<br>S              | 5 ug/L<br>1 ug/g       | 6.4    |
| Pb (GF)         | W<br>S              | 0.5 ug/L<br>1 ug/g     | 1.09   |
| Zn (DCP)        | W<br>S              | 5 ug/L<br>1 ug/g       | 10.2   |
| Hg              | W<br>S              | 0.02 ug/L<br>0.02 ug/g | 0.0565 |
| Cd (GF)         | W<br>S              | 0.1 ug/L<br>0.05 ug/g  | 0.0578 |
| Ni (DCP)        | W<br>S              | 10 ug/L<br>1 ug/g      | 5.6    |



TABLE A7: DETECTION LIMITS FOR SELECTED ALGOMA PARAMETERS BASED ON SIGNAL TO NOISE RATIO AND EPA's MDL's

| Parameter | Matrix <sup>1</sup> | Signal:<br>Noise     | MDL       |
|-----------|---------------------|----------------------|-----------|
| Cr (DCP)  | W<br>S              | 10 ug/L<br>1 ug/g    | 8.7       |
| Al (DCP)  | W<br>S              | 20 ug/L<br>5 ug/g    | 16        |
| Se        | W<br>S              | 0.1 ug/L<br>0.5 ug/g | 0.96<br>- |

<sup>1</sup> W = water; S = sediments.

used extensively for calibration and as a check on accuracy. Both samples and blanks are spiked with surrogate standards, compounds very close in structure to the analytes themselves.

#### A4.4.1 Results of Surrogate Spiking - Organic Analyses

Results of the surrogate spikes for analyses of phenol species by Novalab Ltd. are presented in Tables A10. Of the six water samples analyzed for these parameters, four had only barely detectable levels of phenols or none at all. Recoveries of the surrogate standards, D<sub>5</sub>-phenol and trifluoromethyl-m-cresol in both samples and blanks were greater than 90%. Two samples, however, A1-2 and B-1 had relatively high levels of phenols and poor recoveries of the surrogate standards in both the samples and blanks. In order to detect any nitrophenols which might be present in these samples, the two samples were rerun without acetylation. Detectable levels of nitrophenols, however, were not observed either with or without acetylation. The low recoveries of the surrogate standards, especially the trifluoromethyl-m-cresol, are not easily explained. The similar levels of cresol (M, P and O) in both acetylated and unacetylated samples, despite largely different recoveries of the cresol surrogate in A1-2 (17.9 and 54.9%, respectively), suggest a spiking problem during the analyses. A similar explanation may explain the poor recoveries of the surrogates in the blanks run with acetylation. In many respects, these two samples, A1-2 and B-1, were highly unusual. VOC concentrations in these samples were greater than 82,000 and 10,000 ug/L, respectively, and PAH levels were also very high. Sample A1-2 had a conductivity greater than 7,000 uS/cm and contained abnormally high levels of sulphate (4,700 mg/L), iron (620 mg/L) and magnesium (620 mg/L). It is likely the matrices of these samples were significantly different from the other samples.

Results of surrogate spikes for PAH analyses are presented in Table A10. Recoveries obtained are typical for these organic analyses. Insufficient historic data exist at BAS for calculation of specific control limits for surrogate recoveries in PAH analysis.

#### Logical Data Checks

Analytical data at BAS are checked routinely for internal consistency. One of the common verifications of logical consistency is the calculation of an anion-cation balance

TABLE A10: SURROGATE RECOVERIES FOR ANALYSIS OF PHENOLIC SPECIES

| Sample         | Surrogate Standard       | % Recovery<br>(Sample) | % Recovery<br>(Blank) |
|----------------|--------------------------|------------------------|-----------------------|
| A1-2           | D5 phenol                | 9.2/15.2 <sup>1</sup>  | 40/96.3 <sup>1</sup>  |
|                | trifluoromethyl-M-cresol | 54.9/17.9 <sup>1</sup> | 71.5/100 <sup>1</sup> |
| B-1            | D5 phenol                | 64.3/77.1 <sup>1</sup> | 40/96.3 <sup>1</sup>  |
|                | trifluoromethyl-M-cresol | 83/78 <sup>1</sup>     | 71.5/100 <sup>1</sup> |
| SPA2           | D5 phenol                | 94.6                   | 96.3                  |
|                | trifluoromethyl-M-cresol | 97                     | 100                   |
| SP-P77         | D5 phenol                | 92.1                   | 96.3                  |
|                | trifluoromethyl-M-cresol | 97                     | 100                   |
| C <sub>4</sub> | D5 phenol                | 100                    | 100                   |
|                | trifluoromethyl-M-cresol | 100                    | 100                   |
| SW1            | D5 phenol                | 92.5                   | 100                   |
|                | trifluoromethyl-M-cresol | 94.8                   | 100                   |

<sup>1</sup> Samples run without acetylation.

TABLE A11: SURROGATE RECOVERIES FOR ANALYSIS OF PAHs

| Sample             | Surrogate Standard                   | % Recovery (sample) |
|--------------------|--------------------------------------|---------------------|
| A1-25.5            | d <sub>8</sub> Naphthalene           | -                   |
|                    | d <sub>10</sub> Phenanthrene         | 90.4                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 101                 |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 62                  |
| C <sub>4</sub> -15 | d <sub>8</sub> Naphthalene           | -                   |
|                    | d <sub>10</sub> Phenanthrene         | 91.5                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 116.9               |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 63.4                |
| A <sub>2</sub> 19  | d <sub>8</sub> Naphthalene           | 75.5                |
|                    | d <sub>10</sub> Phenanthrene         | 89.9                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 113.6               |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 60.2                |
| RS-1               | d <sub>8</sub> Naphthalene           | -                   |
|                    | d <sub>10</sub> Phenanthrene         | 76.7                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 159.1               |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 88.3                |
| RS-11              | d <sub>8</sub> Naphthalene           | 79.5                |
|                    | d <sub>10</sub> Phenanthrene         | 89.8                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 115.0               |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 70.5                |
| RS-10              | d <sub>8</sub> Naphthalene           | 101.7               |
|                    | d <sub>10</sub> Phenanthrene         | 89.6                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 154.8               |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 67.4                |
| RS-9               | d <sub>8</sub> Naphthalene           | 78.7                |
|                    | d <sub>10</sub> Phenanthrene         | 92.7                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 96.1                |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 66.2                |
| RS-2               | d <sub>8</sub> Naphthalene           | 80.1                |
|                    | d <sub>10</sub> Phenanthrene         | 89.3                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 109.7               |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 68.1                |
| D <sub>3</sub> -21 | d <sub>8</sub> Naphthalene           | 86.9                |
|                    | d <sub>10</sub> Phenanthrene         | 91.9                |
|                    | d <sub>12</sub> Benzo(a)pyrene       | 88.2                |
|                    | d <sub>12</sub> Benzo(g,h,i)perylene | 64.1                |

TABLE A11: SURROGATE RECOVERIES FOR ANALYSIS OF PAHs

| Sample          | Surrogate Standard                   | % Recovery<br>(sample) |
|-----------------|--------------------------------------|------------------------|
| SW <sub>2</sub> | d <sub>8</sub> Naphthalene           | 83.8                   |
|                 | d <sub>10</sub> Phenanthrene         | 88.8                   |
|                 | d <sub>12</sub> Benzo(a)pyrene       | 99.3                   |
|                 | d <sub>12</sub> Benzo(g,h,i)perylene | 67.4                   |
| SW-1            | d <sub>8</sub> Naphthalene           | -                      |
|                 | d <sub>10</sub> Phenanthrene         | 87.2                   |
|                 | d <sub>12</sub> Benzo(a)pyrene       | -                      |
|                 | d <sub>12</sub> Benzo(g,h,i)perylene | 60.0                   |
| SW-5            | d <sub>8</sub> Naphthalene           | -                      |
|                 | d <sub>10</sub> Phenanthrene         | 94.2                   |
|                 | d <sub>12</sub> Benzo(a)pyrene       | 120.1                  |
|                 | d <sub>12</sub> Benzo(g,h,i)perylene | 70.1                   |

**SELECTED CONTROL CHARTS FOR  
STANDARD REFERENCE MATERIALS ANALYZED  
WITH ALGOMA-STELCO SAMPLES**

on the analytical results to determine the deviation of the sample from theoretical electroneutrality. Following methods outlined in Environment Canada (1979), anion-cation balances were calculated for all aqueous samples having a sufficient number of analyses on which to perform the calculation. The results (Table A11) are expressed in percent deviation from electroneutrality. A rating of 5% or less is considered acceptable. Only two samples, A1-2 and B1 were found to fall outside this limit. A1-2, which deviated by 8.6%, was extremely high in conductivity (greater than 7,000 uS/cm). At this conductivity, the relationships used to calculate the ionic balances cannot be assumed to apply. The deviation of 28% in sample B-1 cannot be easily explained. However, as discussed above, both these samples were highly unusual both in inorganic and organic analyses.

#### **A4.5 Corrective Action for a System Out-of-Control**

In applying control charts, loss of control is indicated by five successive points on the same side of the average line or a point beyond the control limit. If such a situation occurs for a particular analysis, subsequent analyses are halted until the system is checked and determined to be in-control again. Results are not released to clients unless the system has been declared in control by the quality control officer.

#### **A4.6 Performance Evaluation Audits**

BEAK has participated and continues to participate in a large number of external audits. The audits involve the analysis of check standards or interlaboratory comparisons of samples conducted by various government agencies. The results of these external audits are available on request. In addition, BEAK is certified for doing work under EPA regulations in New York (Certificate No. 10823). This certification requires BAS to undergo routine proficiency testing and laboratory inspection. BEAK also acts as a private contract laboratory to the Ontario Ministry of the Environment in the Ministry's Inland Lakes Program. This program involves extensive quality control checks of the data produced by Beak Analytical Services.

The following is a summary of the External Performance audits in which we have participated:

Environment Canada  
Canada Centre for Inland Waters  
Burlington, Ontario

The National Interlaboratory Quality Control Program

Continued participation since 1975. Studies 14, 15, 16, 18, 19, 20, 21, 23, 25, 27, 28, 29, 30, 33, 35, DQC-2, DQC-3, LRTAP9, 10, 11, 12, 15, 16, 17, 18, 19, QM3, 4, 5, 9, 11 and 12.

Environment Canada  
Fisheries and Oceans  
Captine Bernier Laboratories  
Longueuil, Quebec

Project Analytical Cross-Check Program

Interlaboratory comparison of mercury, cadmium, copper, lead, selenium and zinc in fish tissue in 1977. Interlaboratory comparison of cadmium, mercury, lead and PCBs in sediment and biological material in 1980.

Environment Canada  
Environmental Protection Service  
Bedford Institute of Oceanography

Project Analytical Cross-Check Program

Interlaboratory comparison of mercury, cadmium, copper and PCBs in sediment and biological material in 1980. Quality control check for PCBs, chlorobenzenes and PAHs in standards and spiked sediment.

Ontario Ministry of the  
Environment  
Environmental Laboratory Services  
Branch  
Toronto, Ontario

Leachate Analysis Comparative Study, 1985

Interlaboratory comparison of five industrial waste samples using the MOE Leachate Procedure (LP) for recovery of Cd, Cu, Cr, Mn, Ni, Pb and Zn.

National Research Council of  
Canada  
Ottawa, Ontario

Marine Analytical Chemistry Standard Program  
First Intercomparison Exercise for Trace Metals  
in Marine Sediments - NRC MSI/TM

Calibration for Cu, Zn, Cd, Hg and Pb in 1984.

Energy, Mines and Resources  
Earth Sciences Geological Survey  
of Canada  
Ottawa, Ontario

Canadian Certified Reference Materials Project,  
1984

Collaborative testing of four stream sediments for Hg, Cd, Cu, Cr, Fe, Ni, Pb and Zn.

Eldorado Nuclear Ltd.  
Warman, Saskatchewan  
1977

Environmental assessment of proposed uranium refinery at Warman, Saskatchewan, involved detailed studies of air quality, aquatic, terrestrial and socio-economic aspects. BEAK conducted an extensive hydrogeological investigation program resulting in a novel approach to radioactive waste management.

A5      **References**

ASTM. 1985. ASTM Standards on Precision and Bias for Various Applications. ASTM, Philadelphia, PA. 256 p.

Environment Canada. 1979. Analytical Methods Manual.

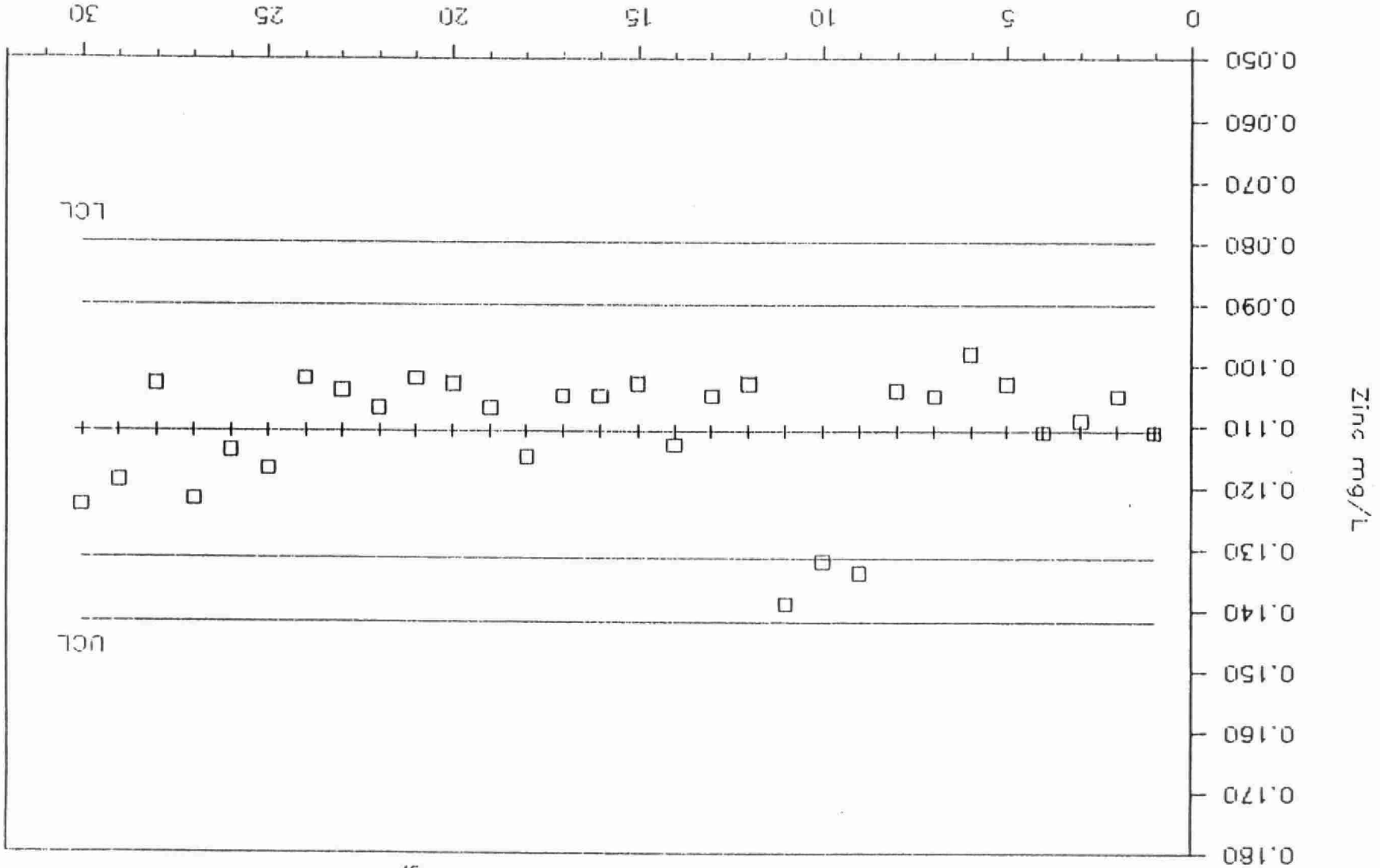


HAMES. 1983. Handbook of Analytical Methods for Environmental Samples. Ontario Ministry of the Environment.

Ontario Ministry of the Environment (MOE). 1976. Quality Control and Data Evaluation Procedures. Laboratory Services Branch, Data Quality Report Series Appendix.

U.S. Environmental Protection Agency (EPA). 1979. Handbook for Analytical Quality Control in Water and Wastewater Laboratories. EPA-600/4-79-019.

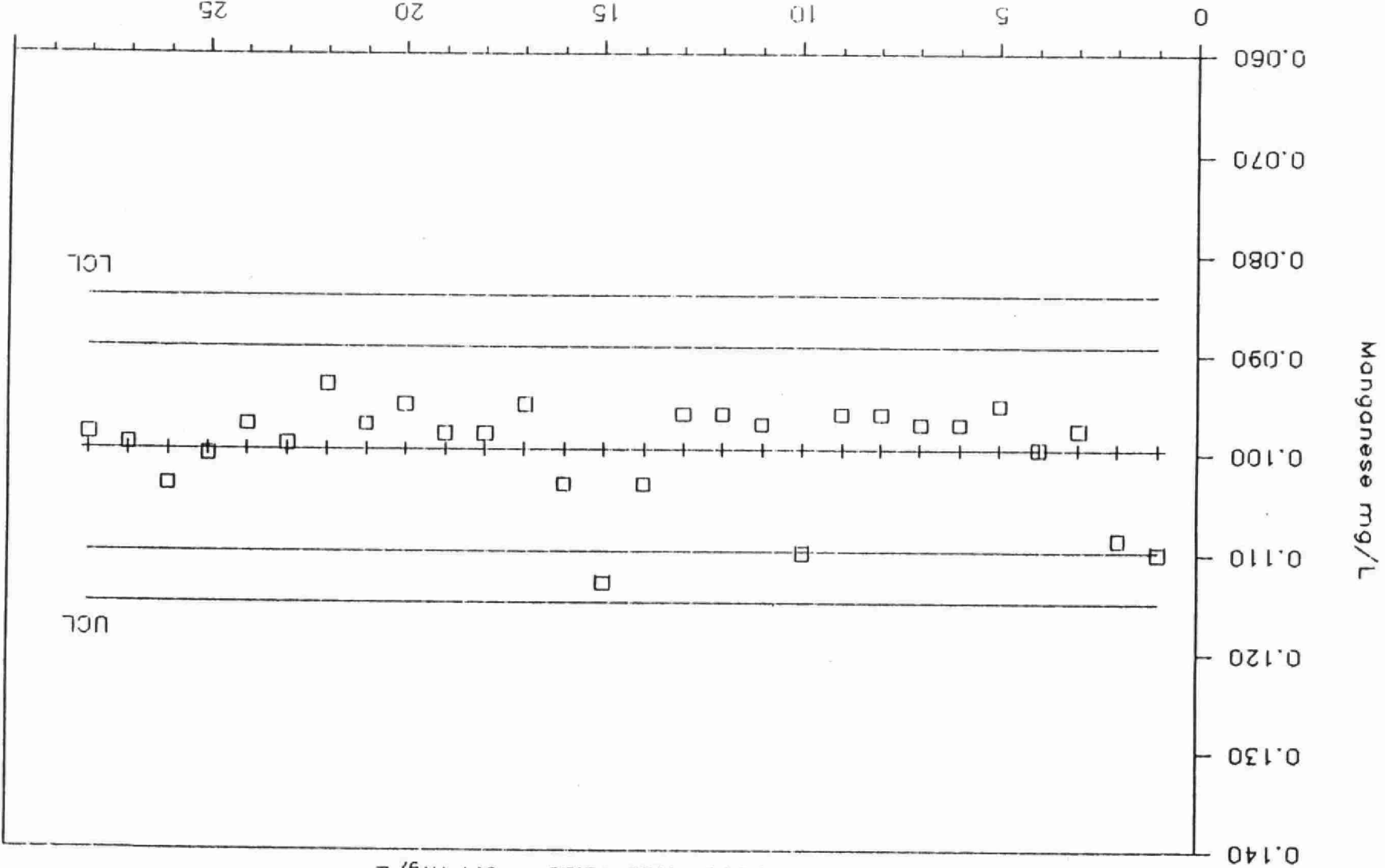
# Zinc (DCP) WP3861 880609-880815 True Value = 0.1 mg/L



Sample Number  
Average Value

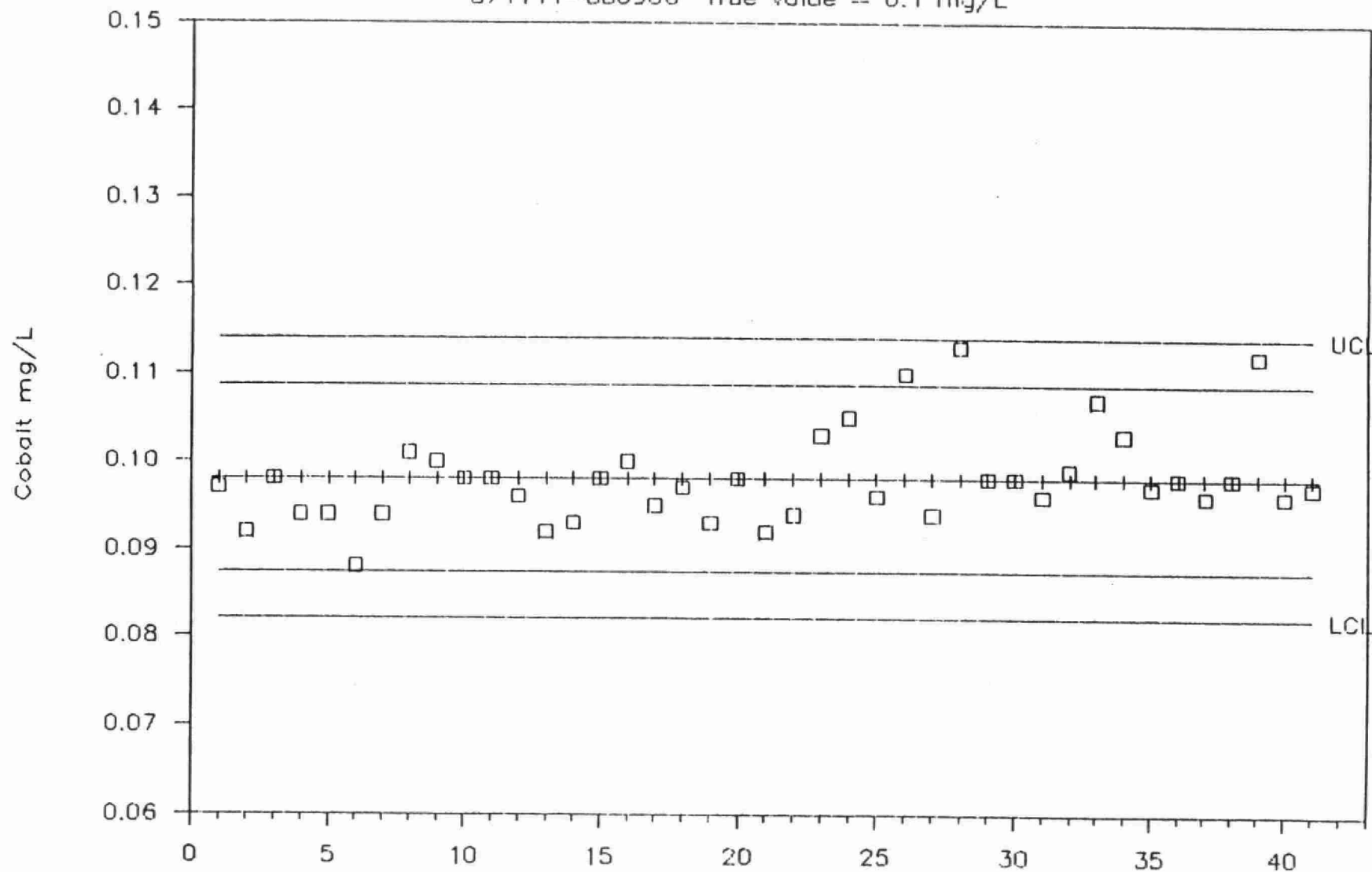
# Manganese (DCP) WP3861

880531-880815 True Value = 0.1 mg/L



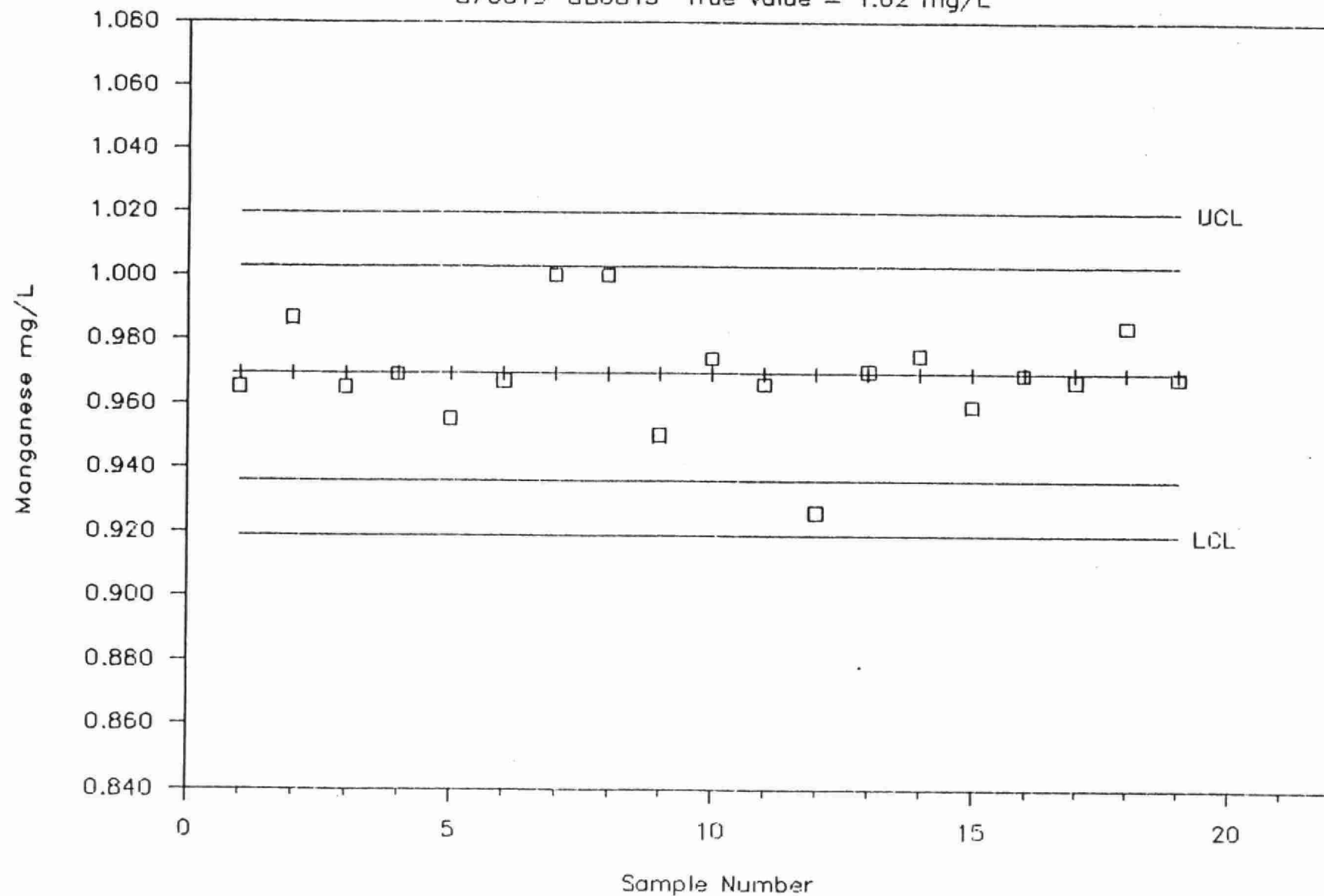
# Cobalt (DCP) WP3861

871111-880906 True Value = 0.1 mg/L



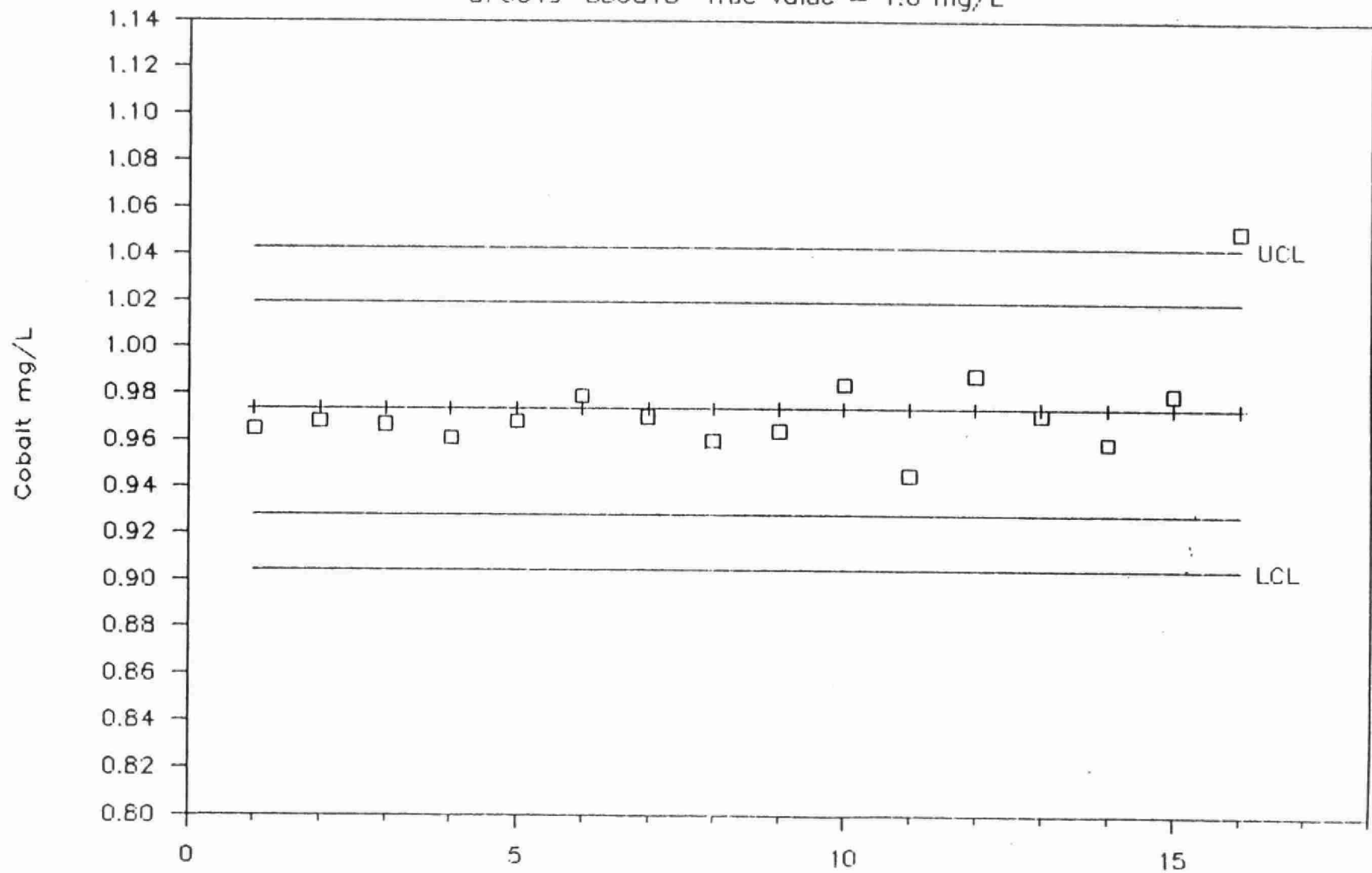
# Manganese (DCP) ICAP19

870619-880815 True Value = 1.02 mg/L

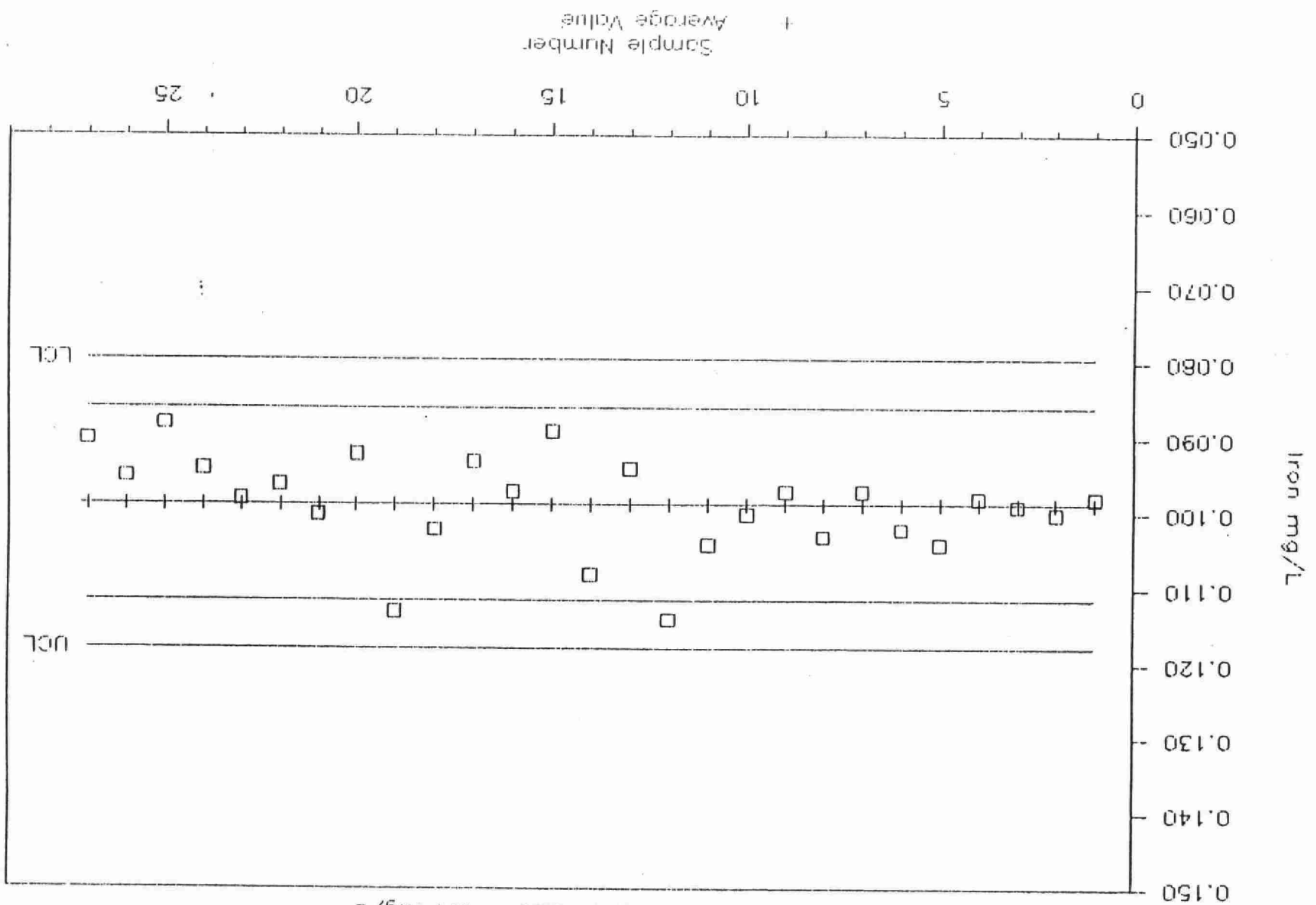


# Cobalt (DCP) ICAP19

870619-880815 True Value = 1.0 mg/L

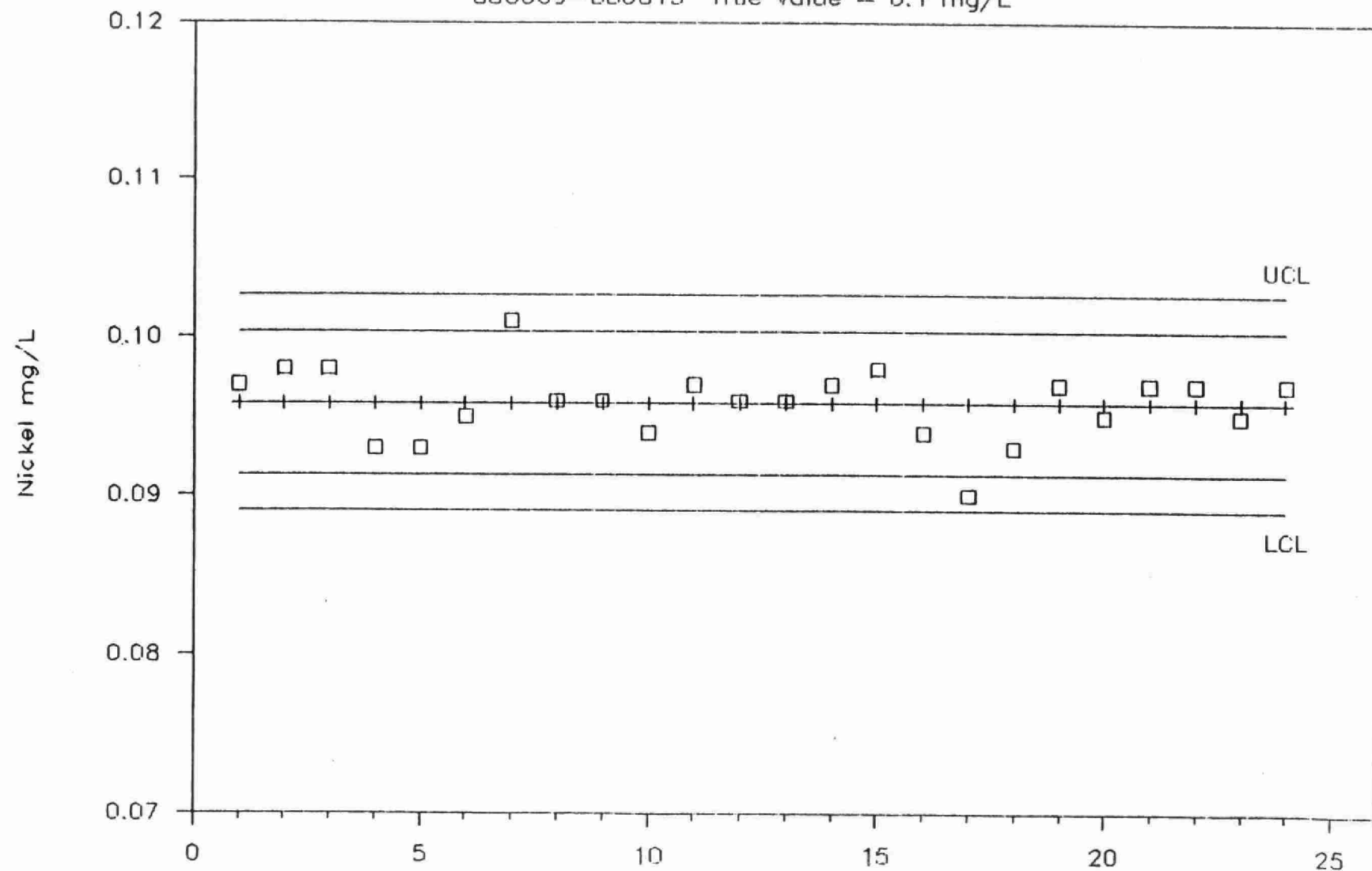


Iron (DCP) WP386#1  
 880609-880815 True Value = 0.1 mg/L



# Nickel (DCP) WP386I

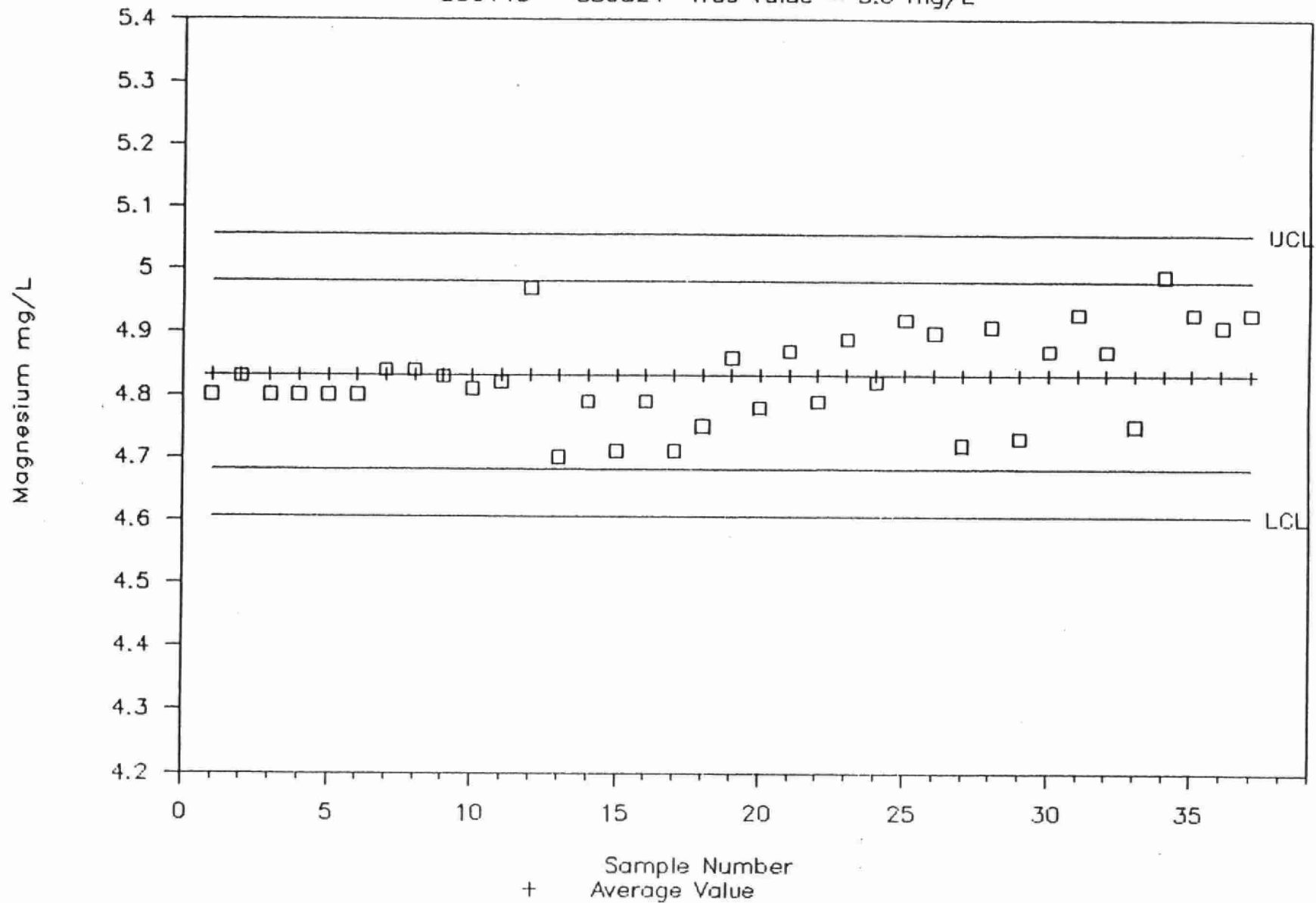
880609--880815 True Value = 0.1 mg/L





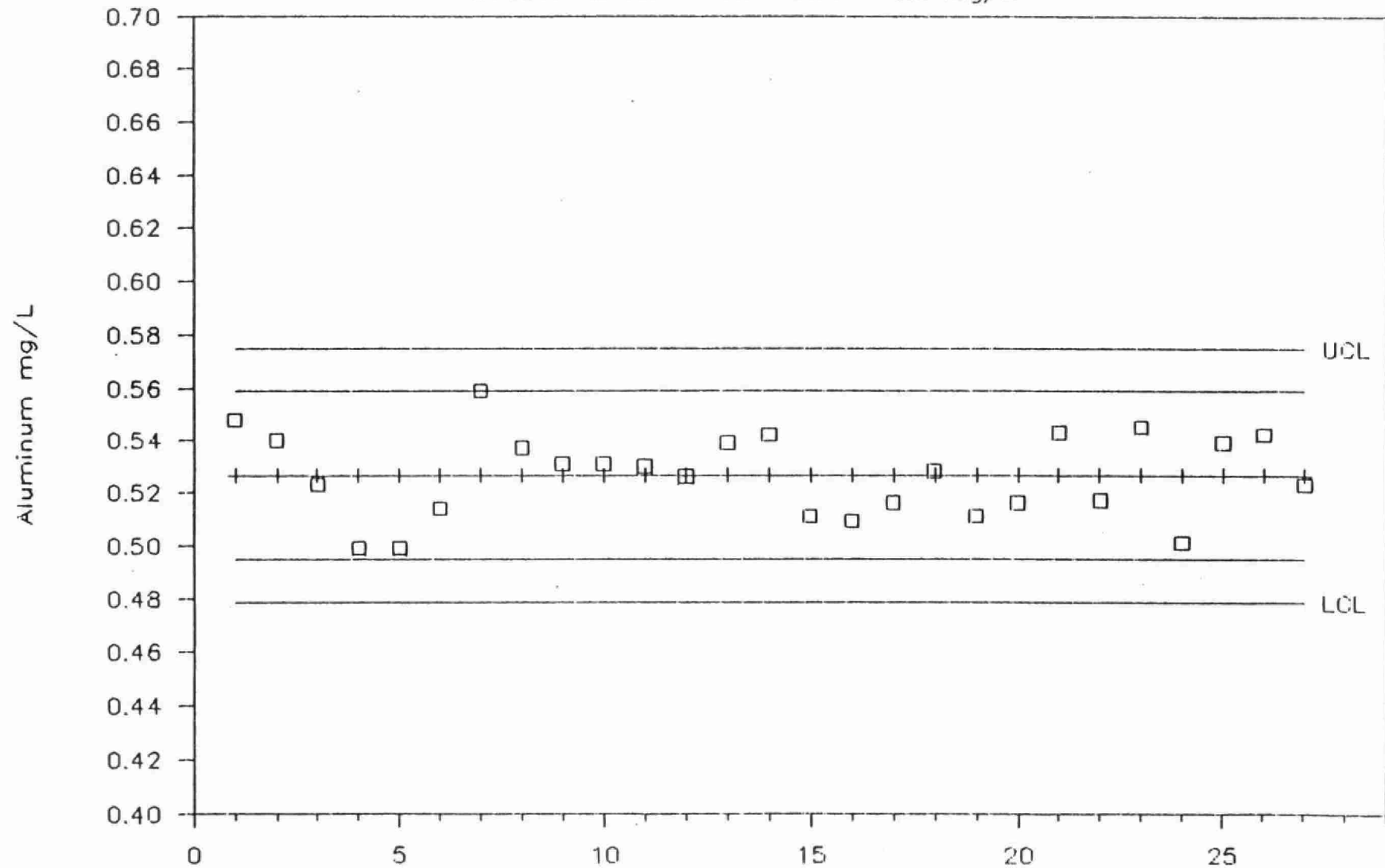
# Magnesium (DCP) WP1185

880113 - 880821 True Value = 5.0 mg/L



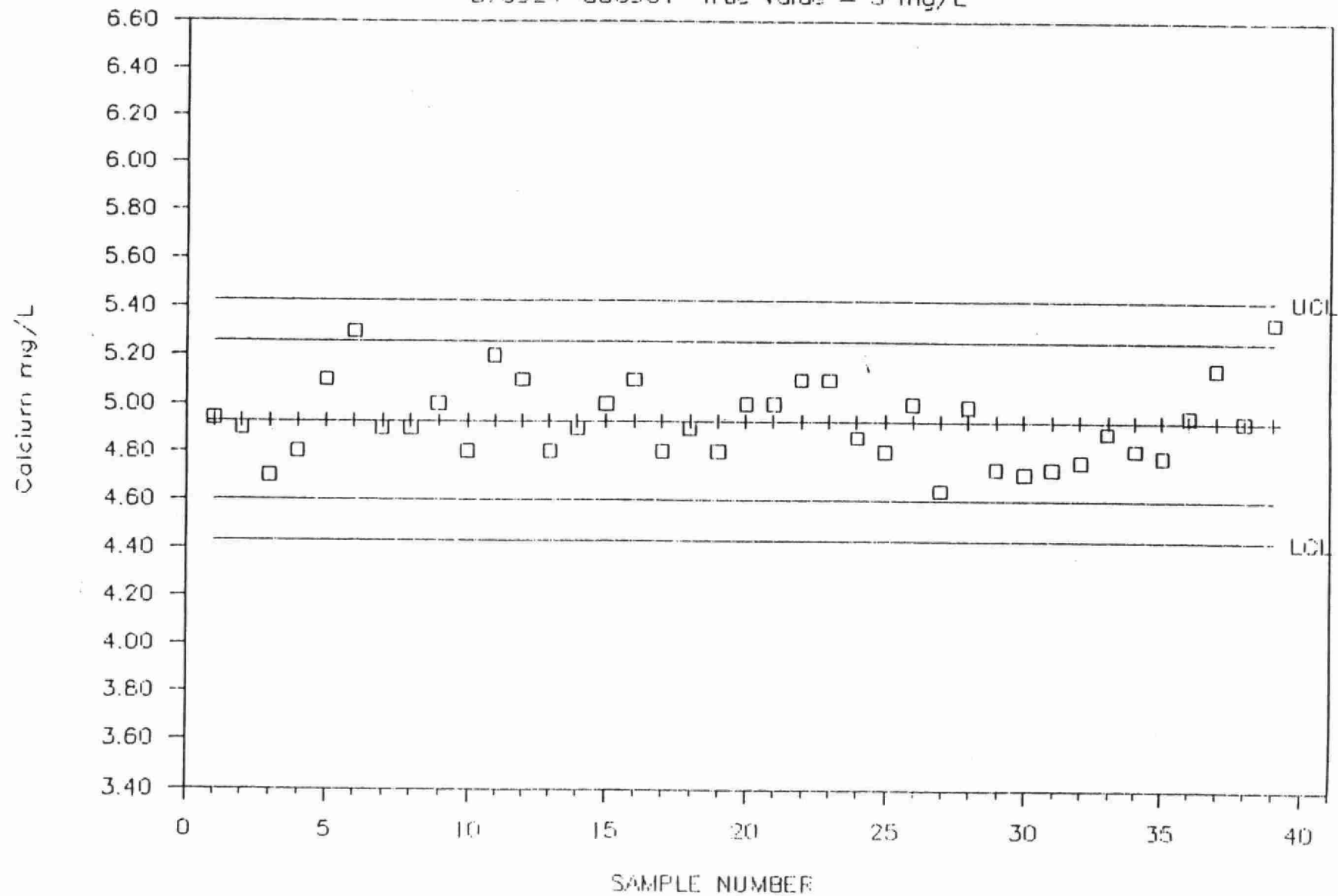
# Aluminum (DCP) WP3861

870313-880906 True Value = 0.5 mg/L



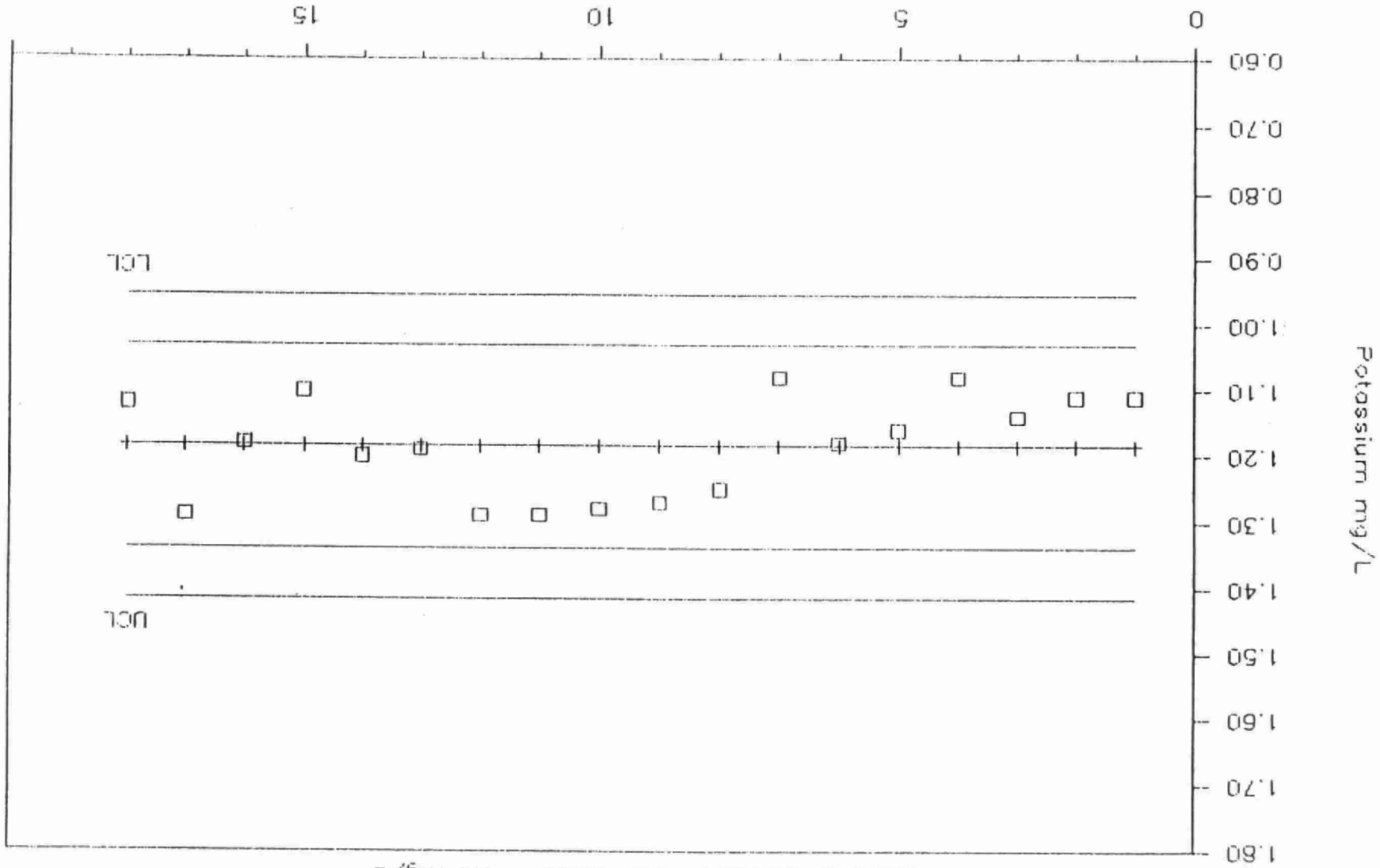
# Calcium (DCP) WP686

870924-880901 True Value = 5 mg/L



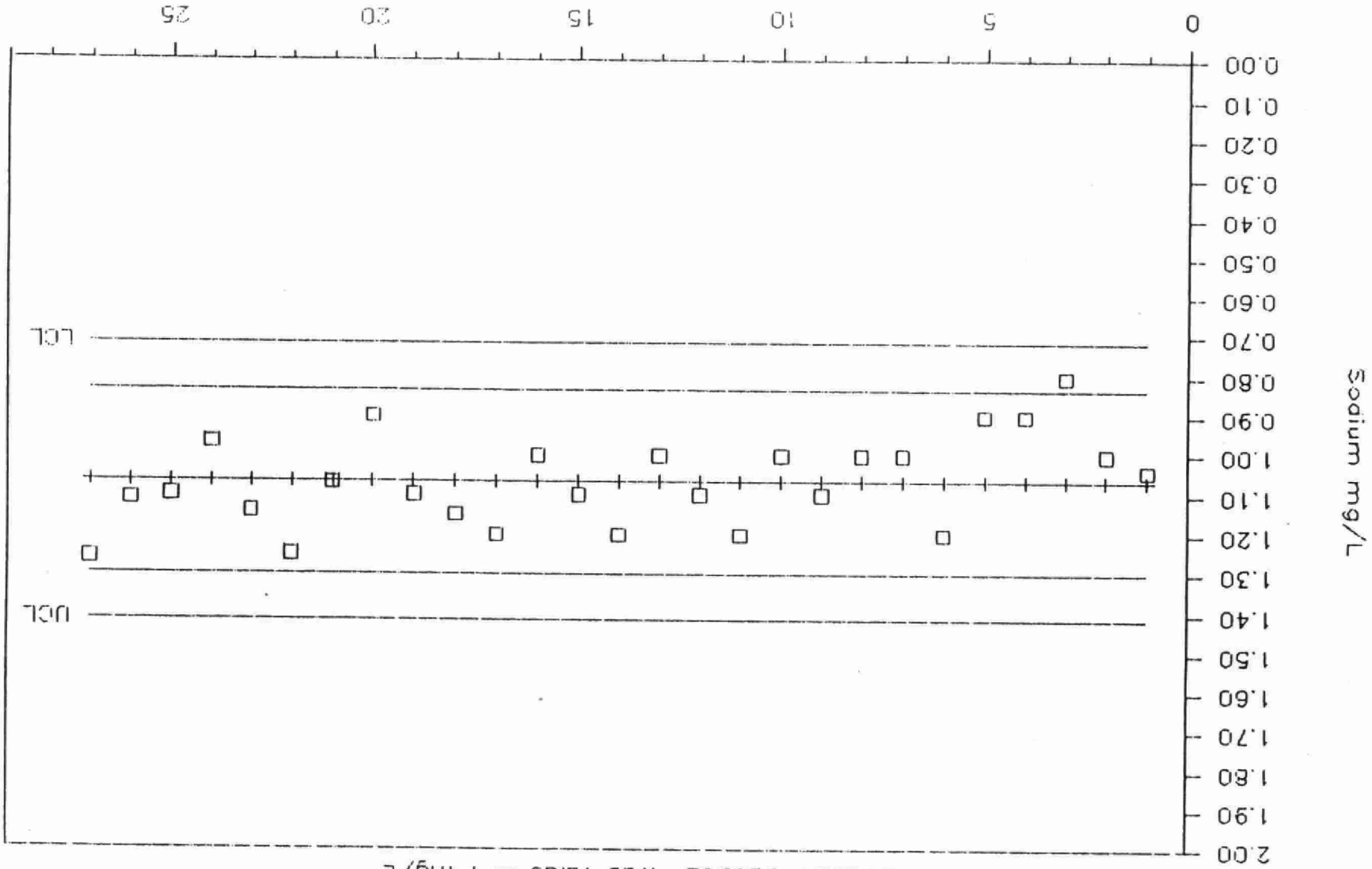
# Potassium (DCP) WP686

880616-880820 True Value = 1.0 mg/L



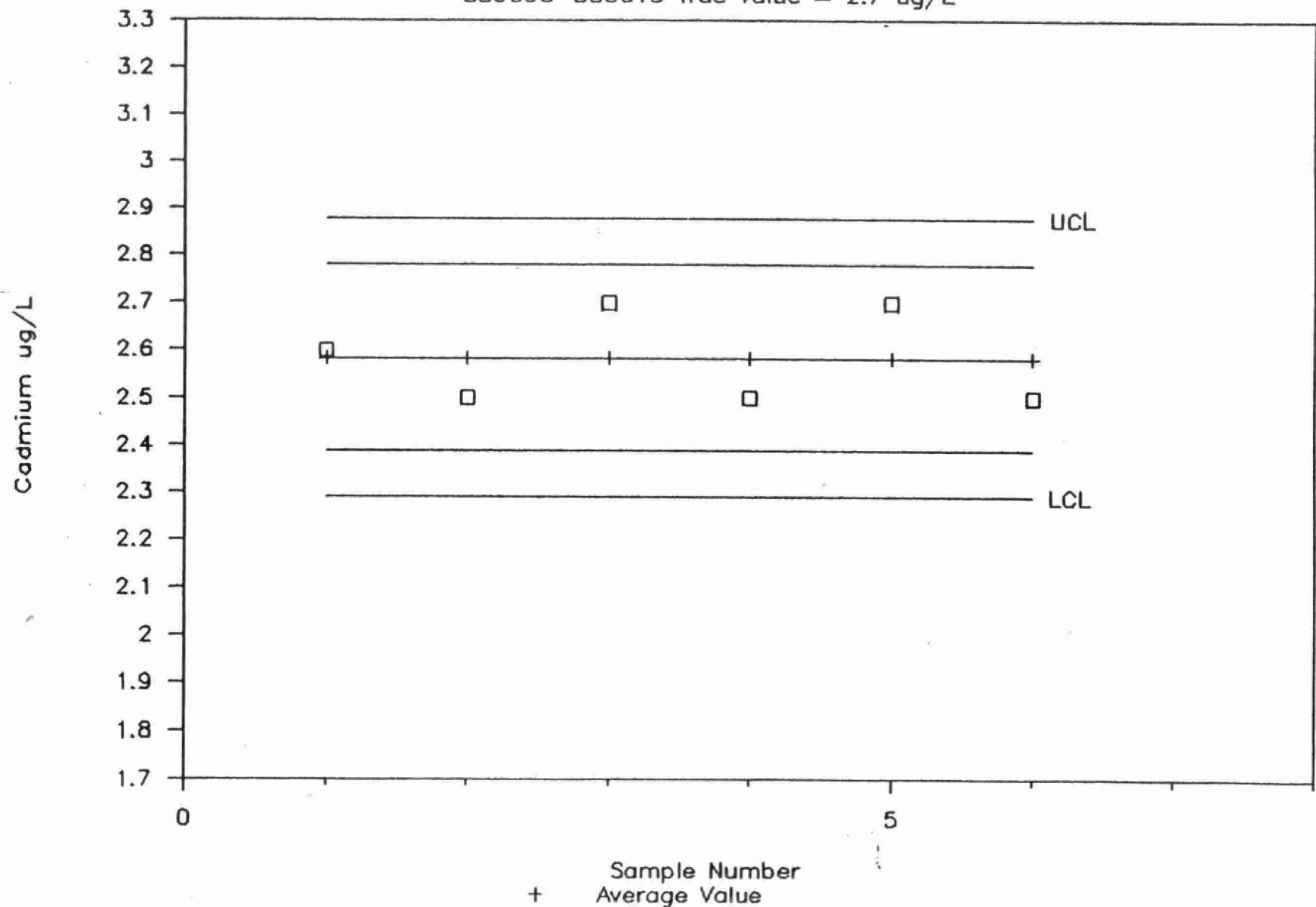
# Sodium (DCP) WP686

870924-880902 True Value = 1 mg/L



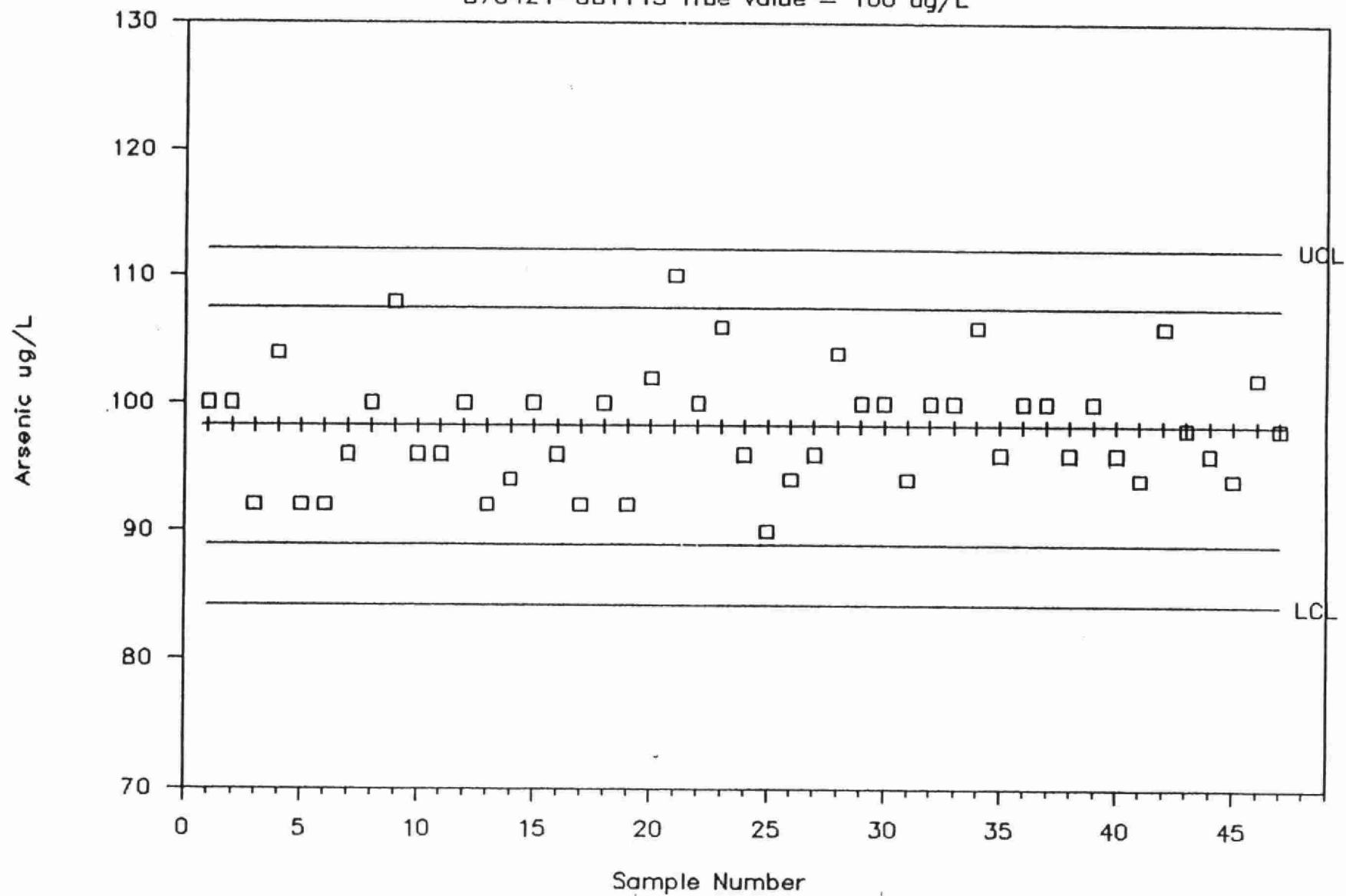
# Cadmium (GFAAS) WS378#4

880606-880616 True Value = 2.7 ug/L



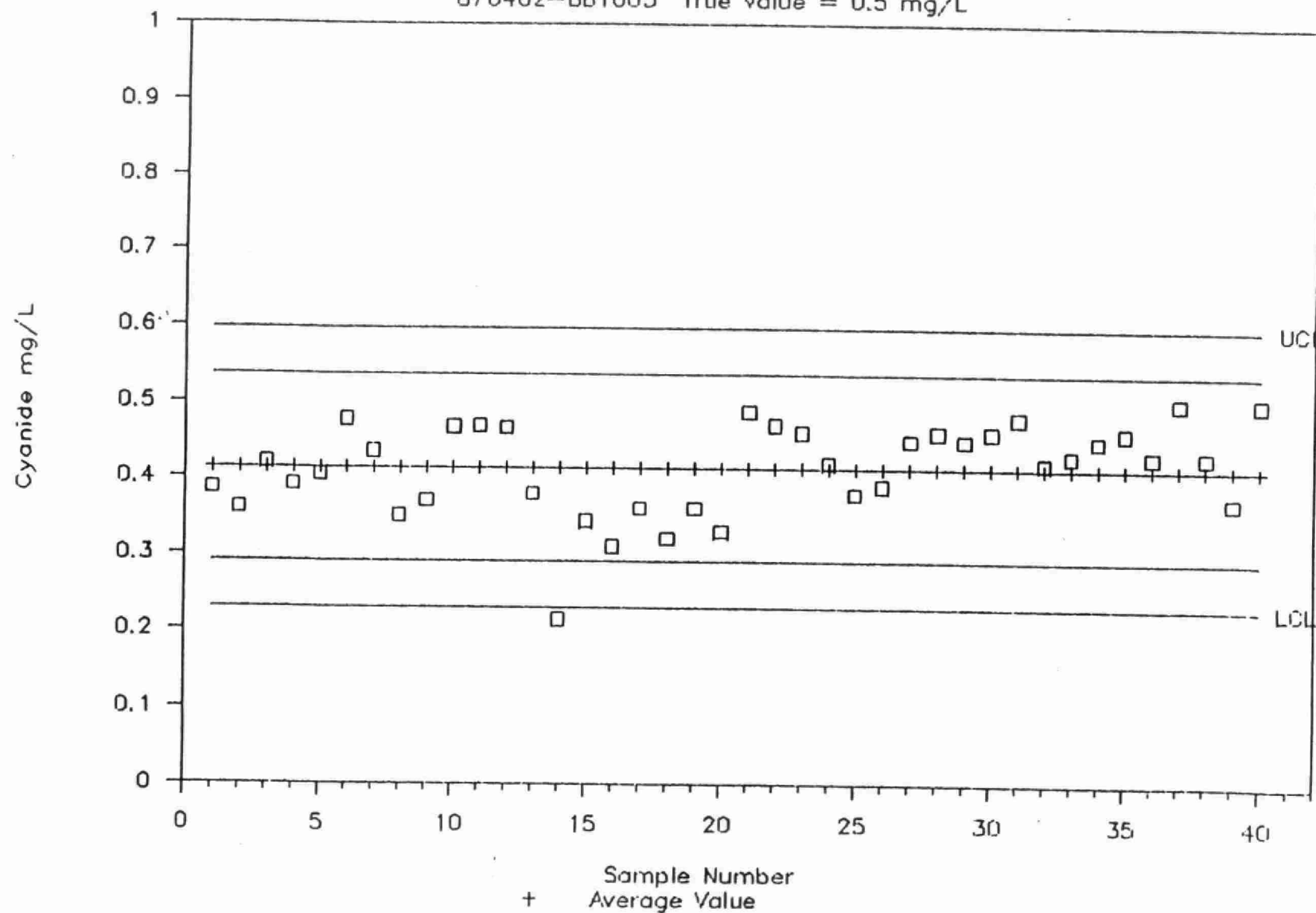
# Arsenic WP386I

870421-881115 True Value = 100 ug/L



# Cyanide WP586

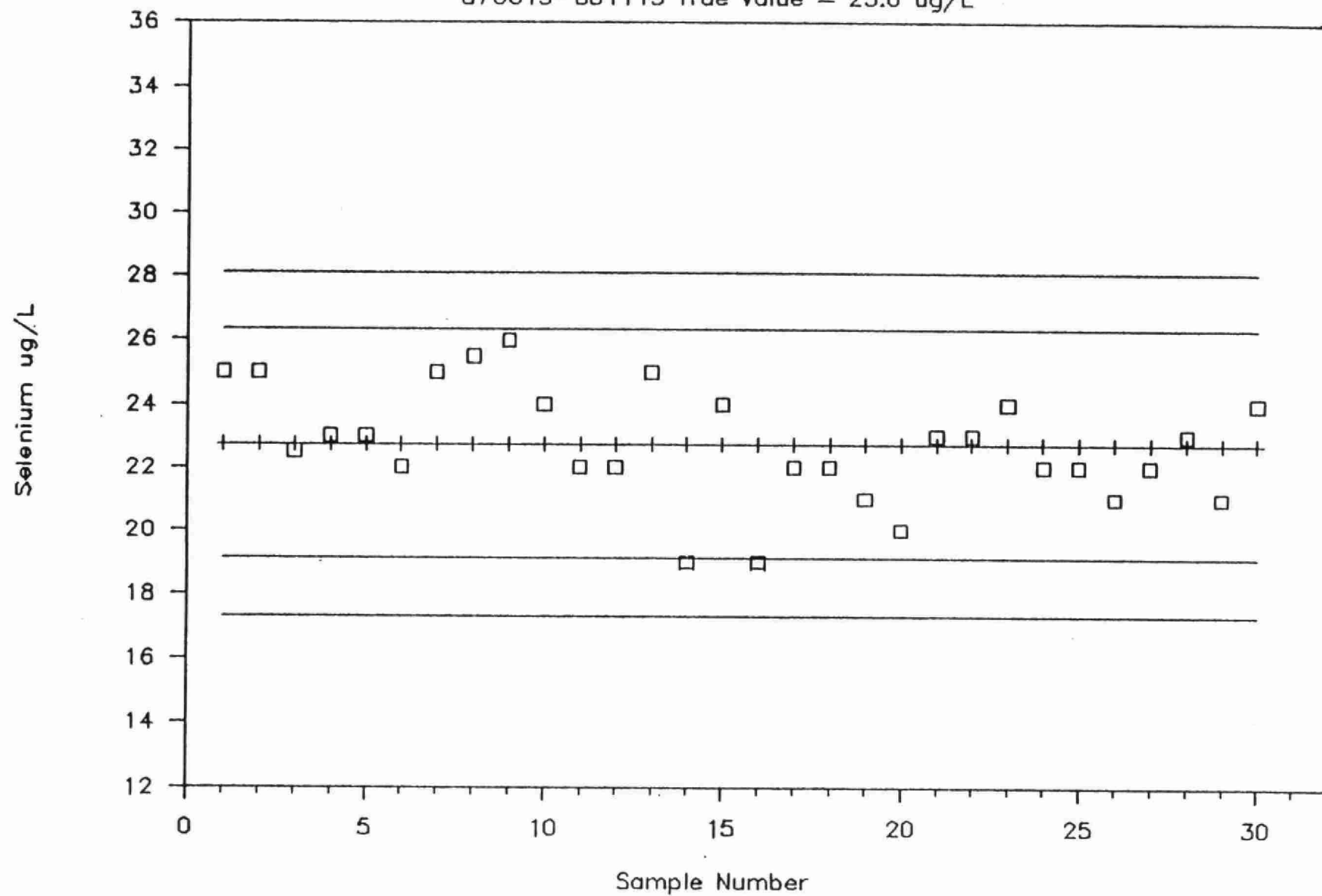
870402-881003 True Value = 0.5 mg/L





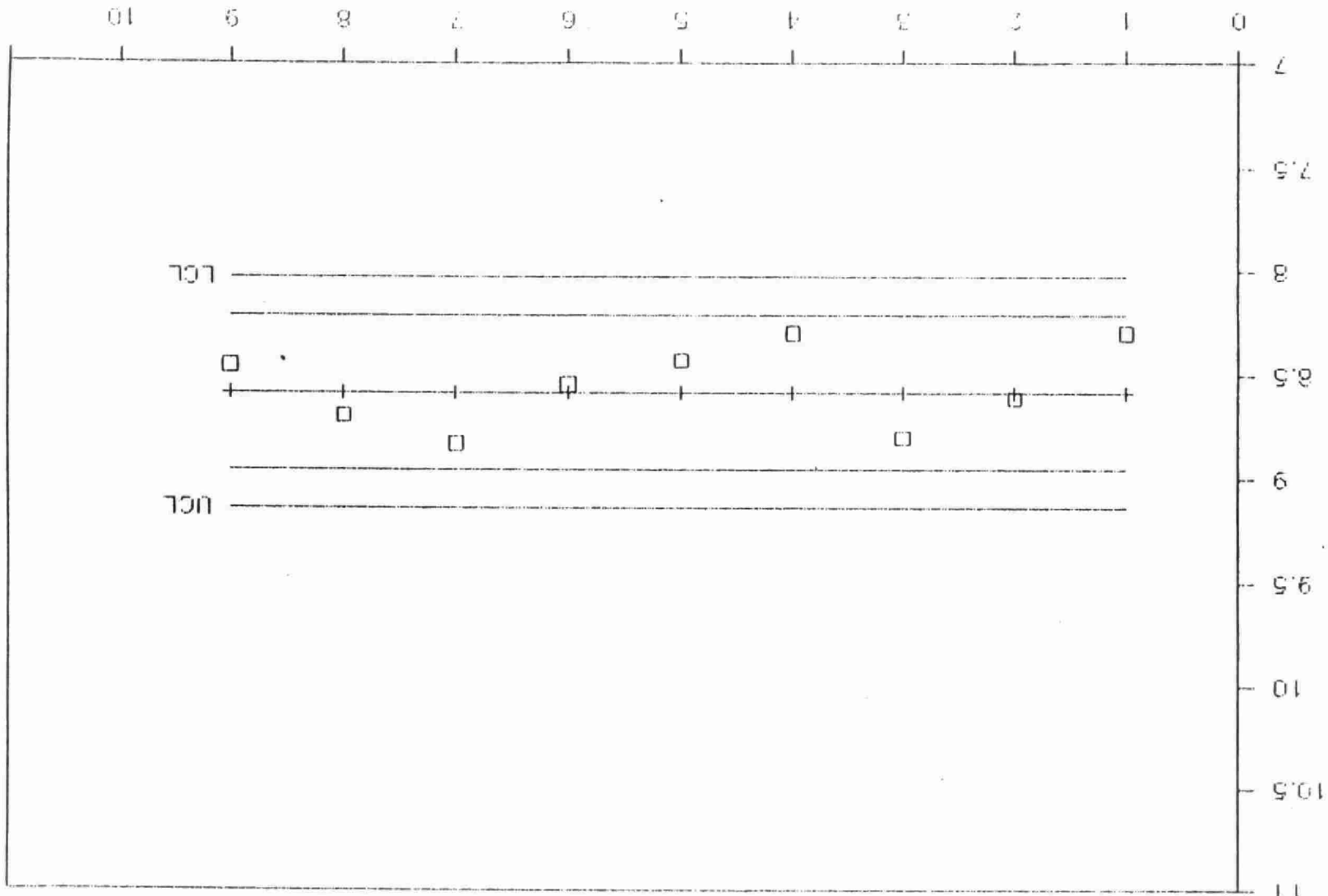
# Selenium WP386I

870015-881115 True Value = 25.0 ug/L



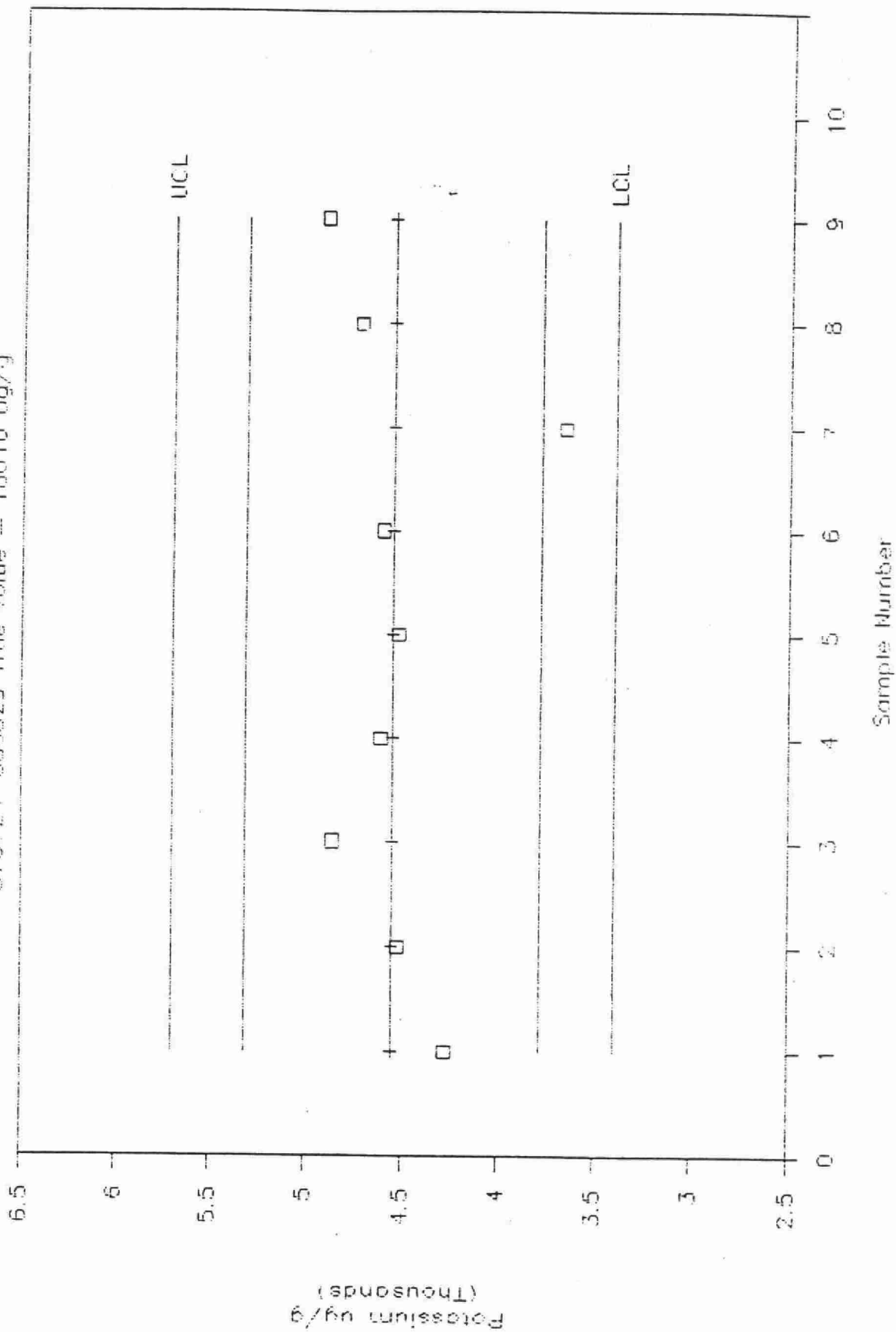
# Sodium (DCP) BCSS-1

670724-880820 True Value = 20180 ug/g



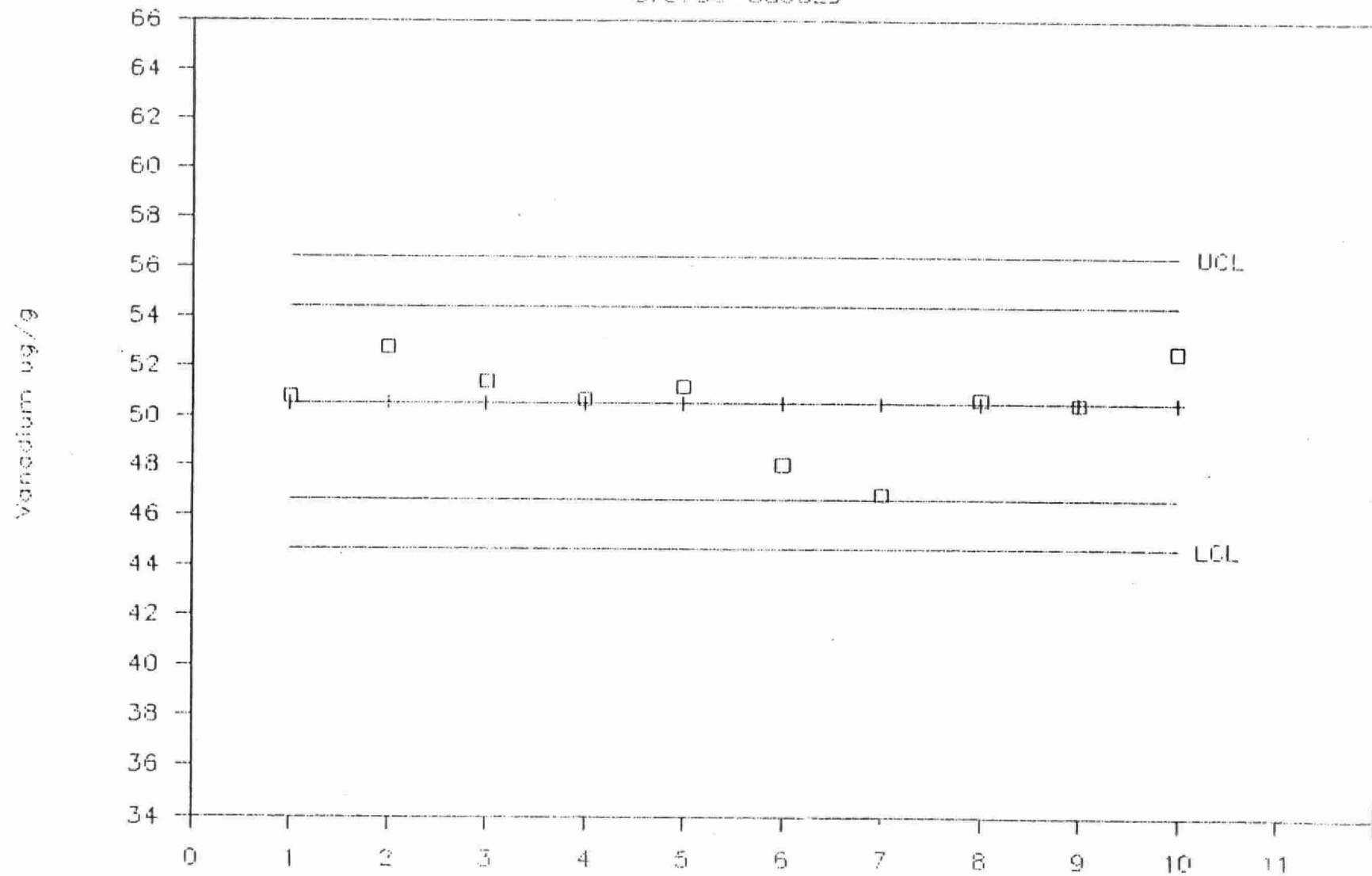
# Potassium (DCP) BCSS-1

670724-880829 True Value = 18010 ug/g



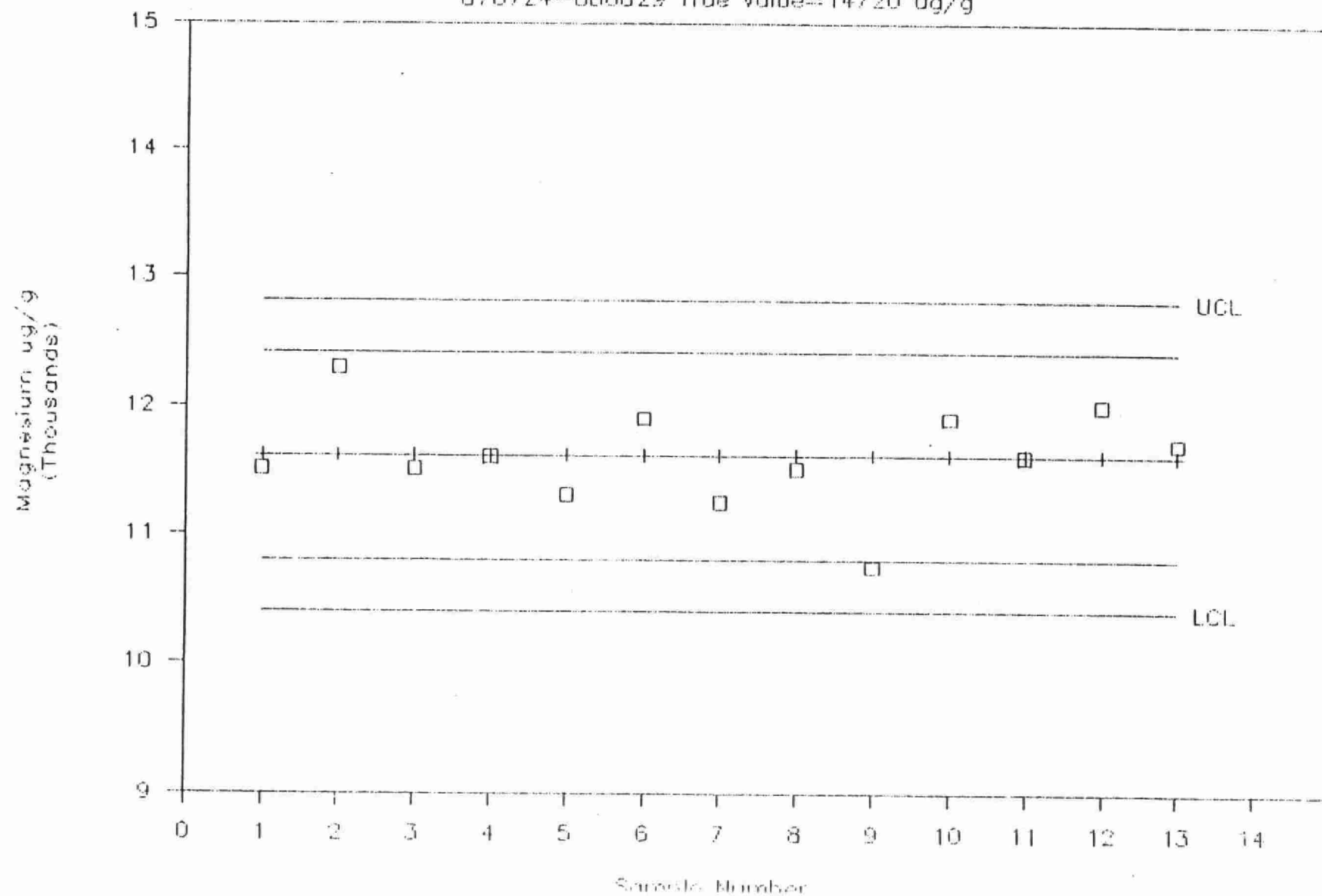
# Vanadium (DCF) BCSS-1

870730-880829



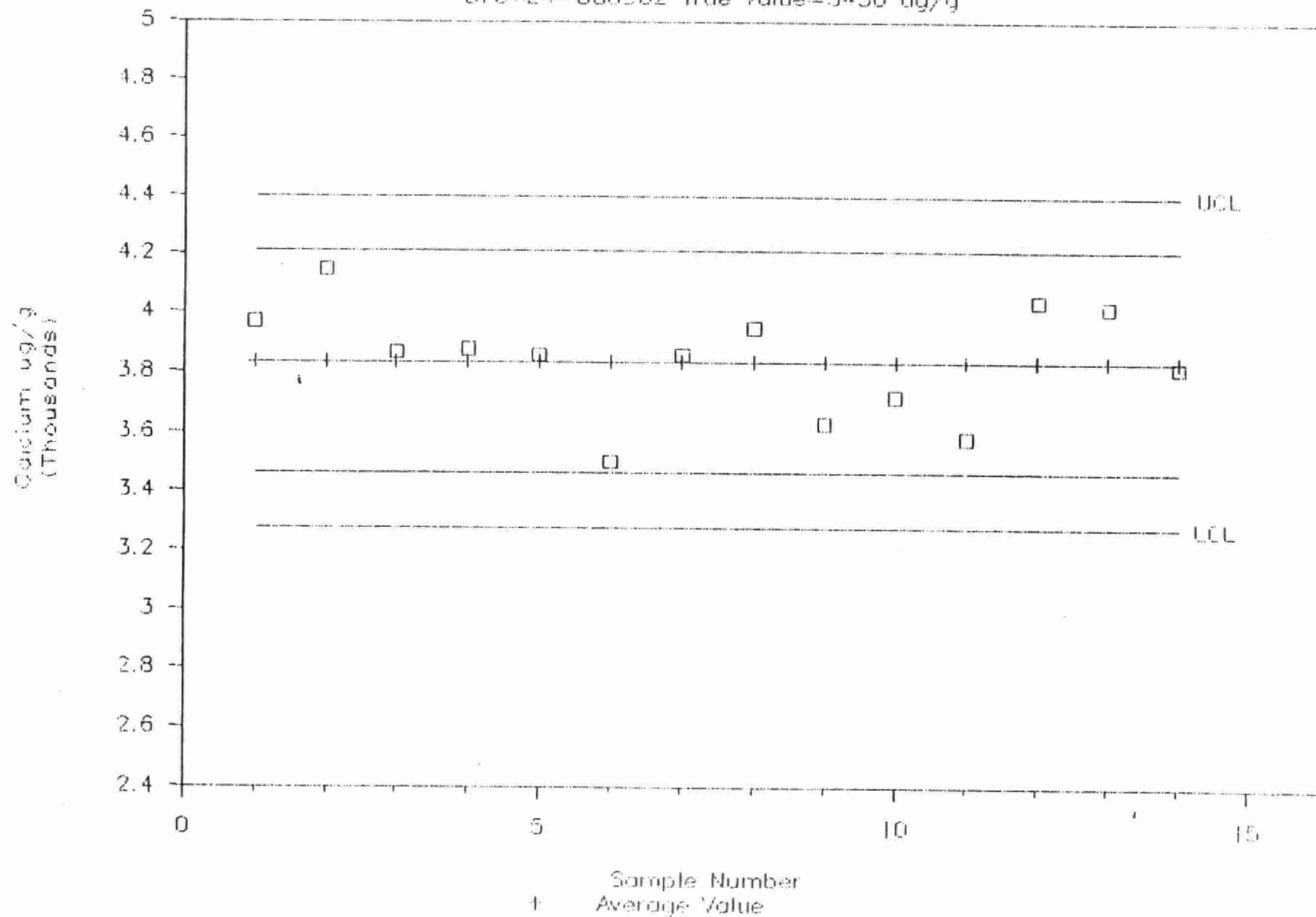
# Magnesium (DCP) BCSS-1

870724-880829 True Value=14720 ug/g



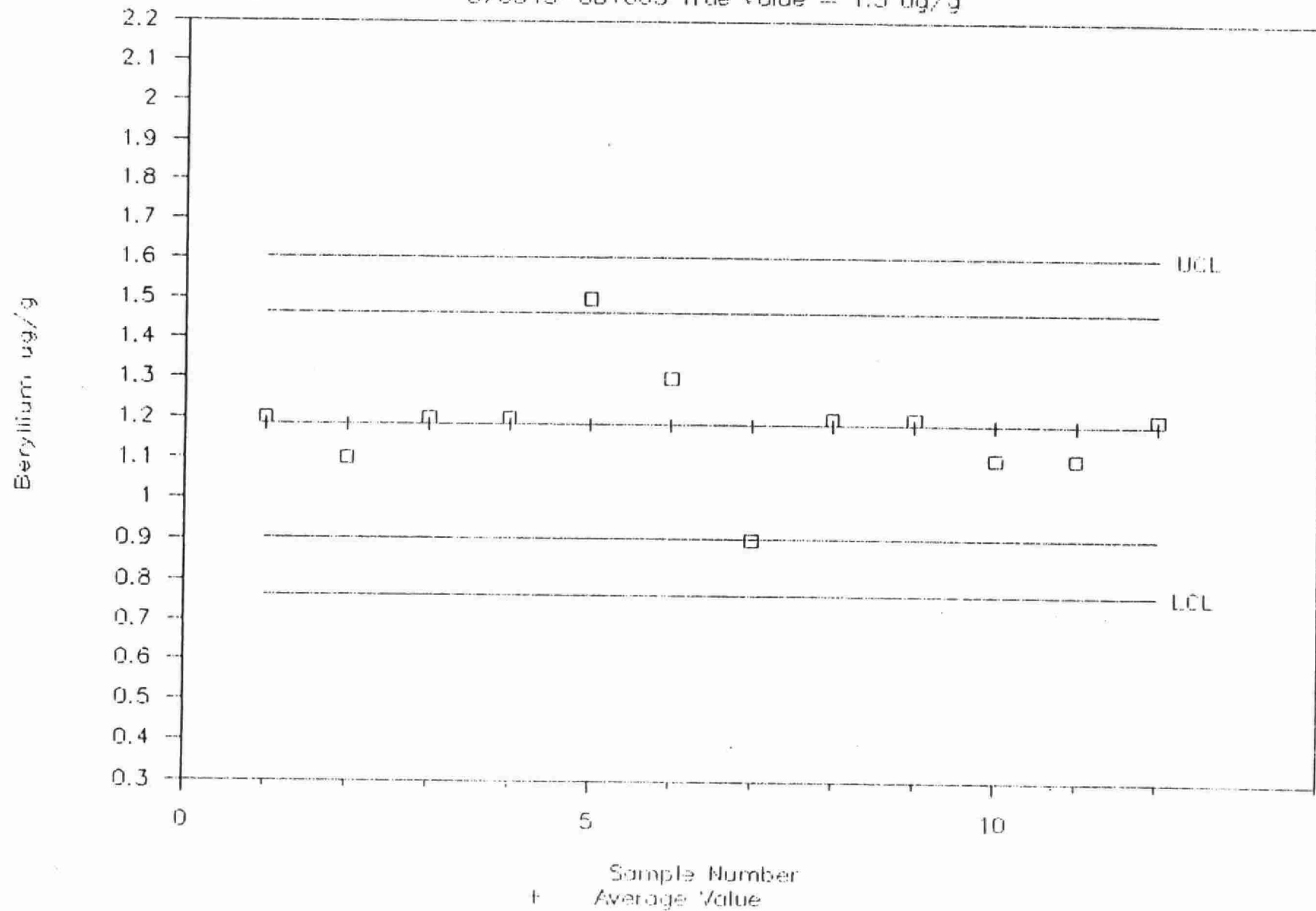
# Calcium (DCP) BCSS-1

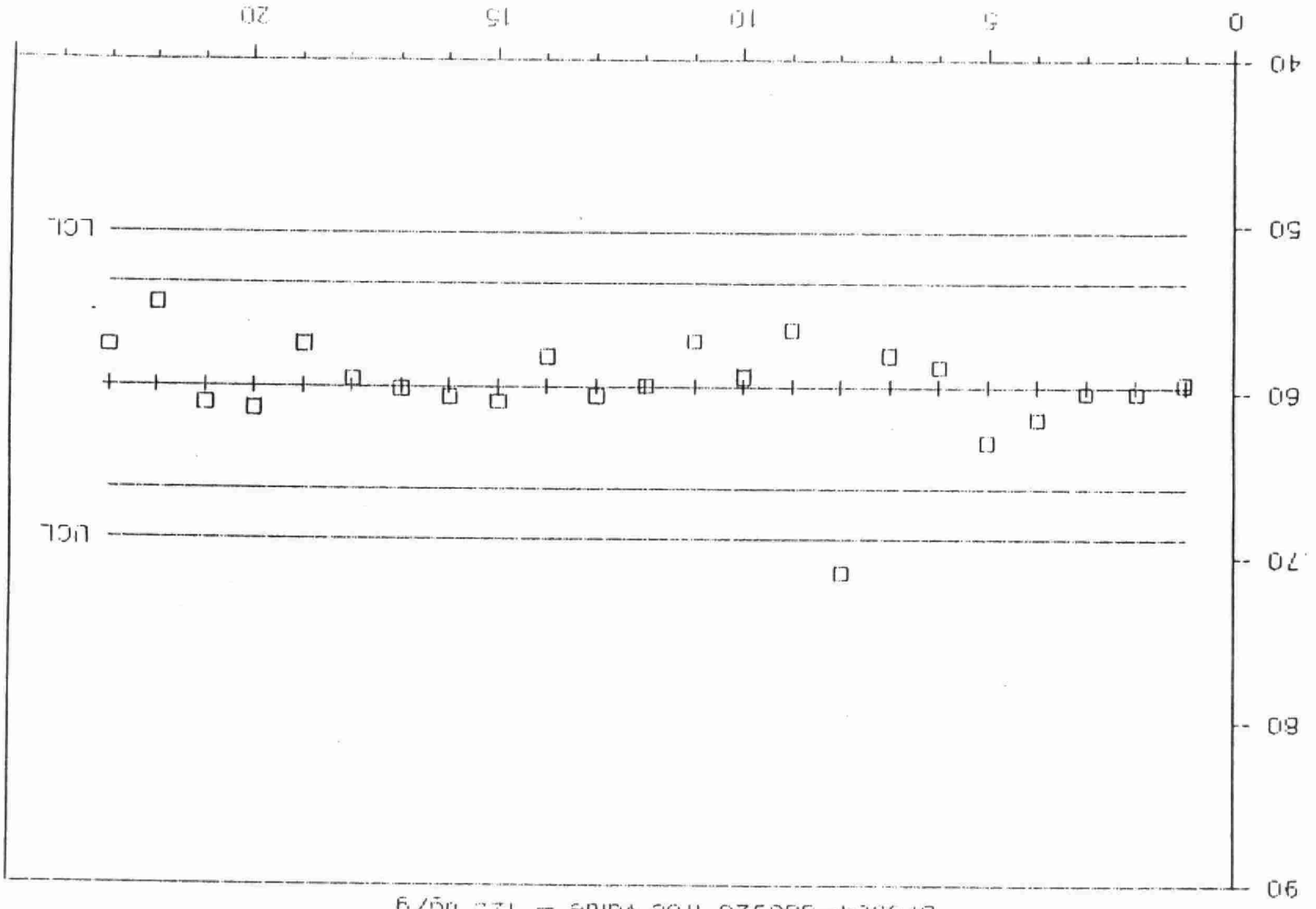
870724--880902 True Value=5430 ug/g



# Beryllium (DCP) BCSS-1

870513-881005 True Value = 1.3 ug/g

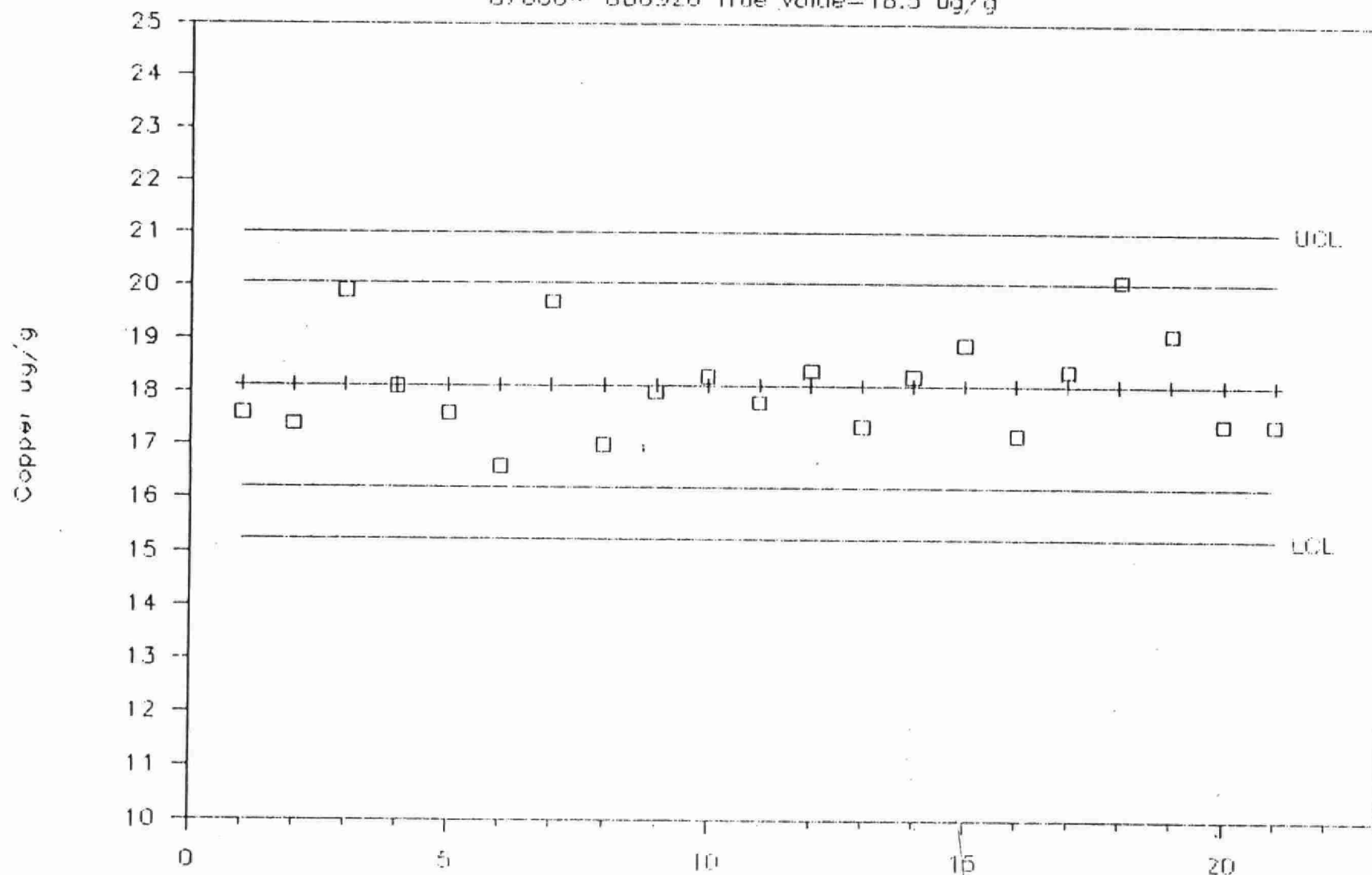






# Copper (DCP) BCSS-1

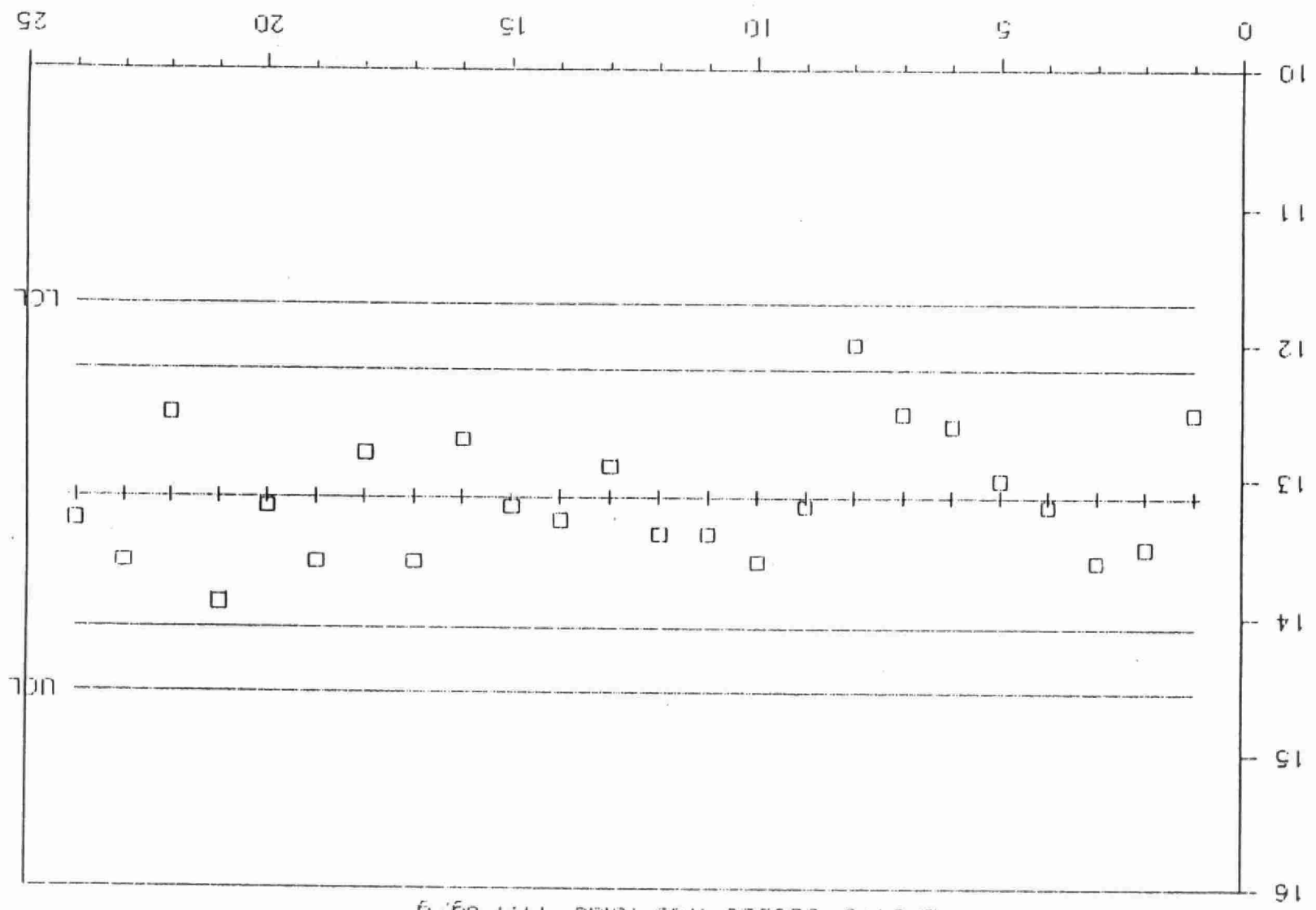
870604--880920 True Value=18.5 ug/g



# Cobalt (DCP) BCSS-1

870413-880920 True Value=11.4 ug/g

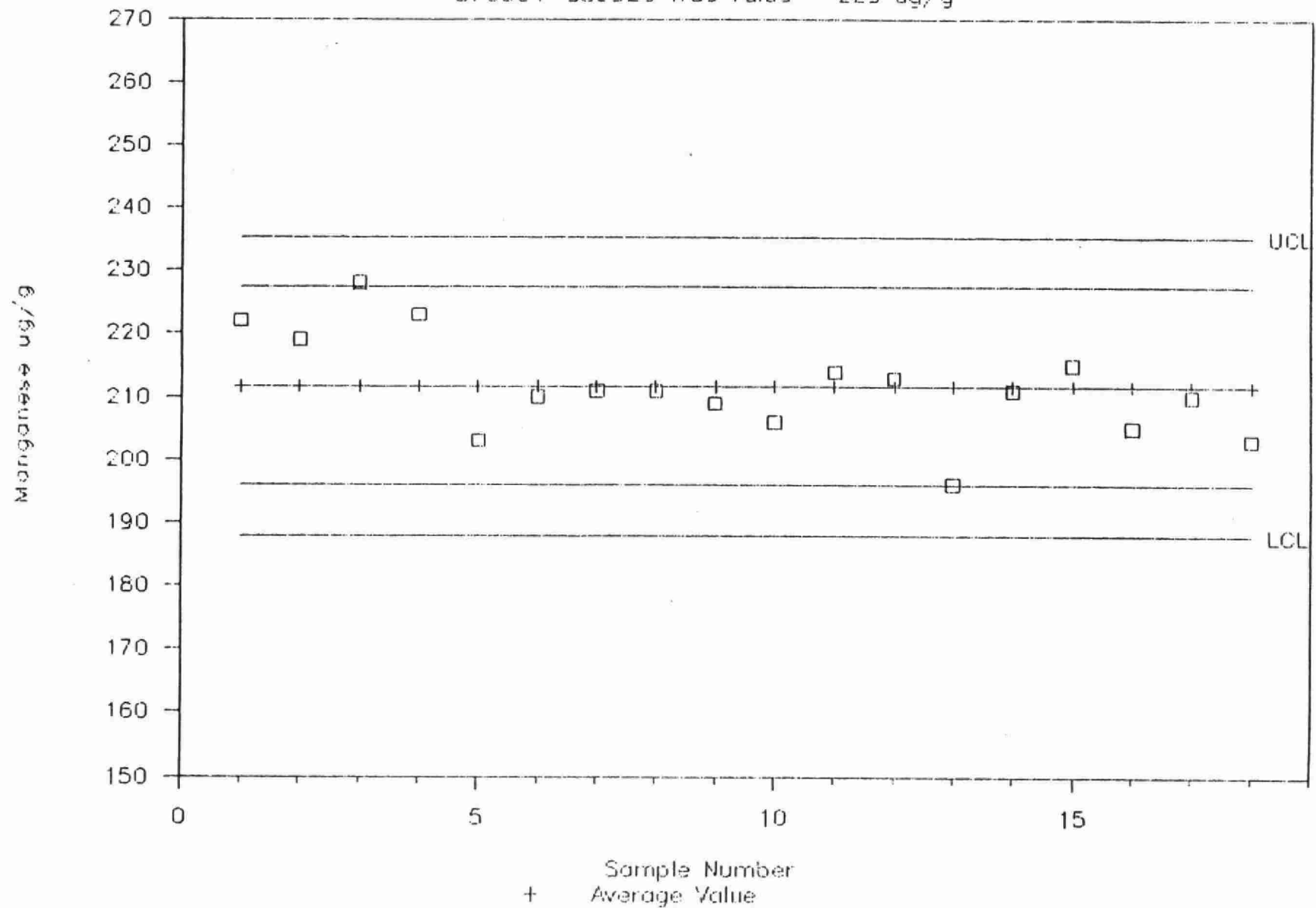
Cobalt ug/g



Sample Number

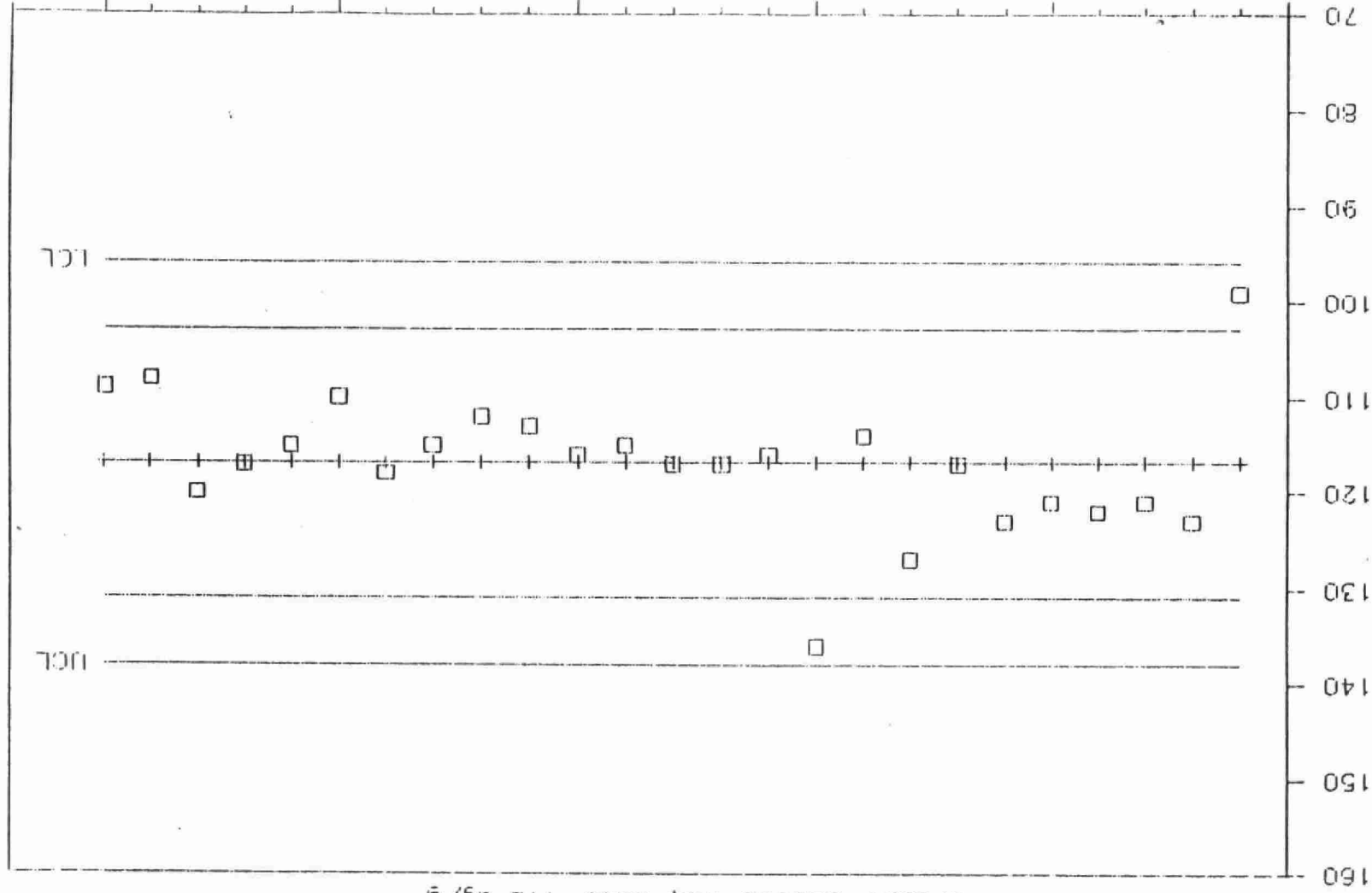
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# Zinc (DCP) BCSS-1

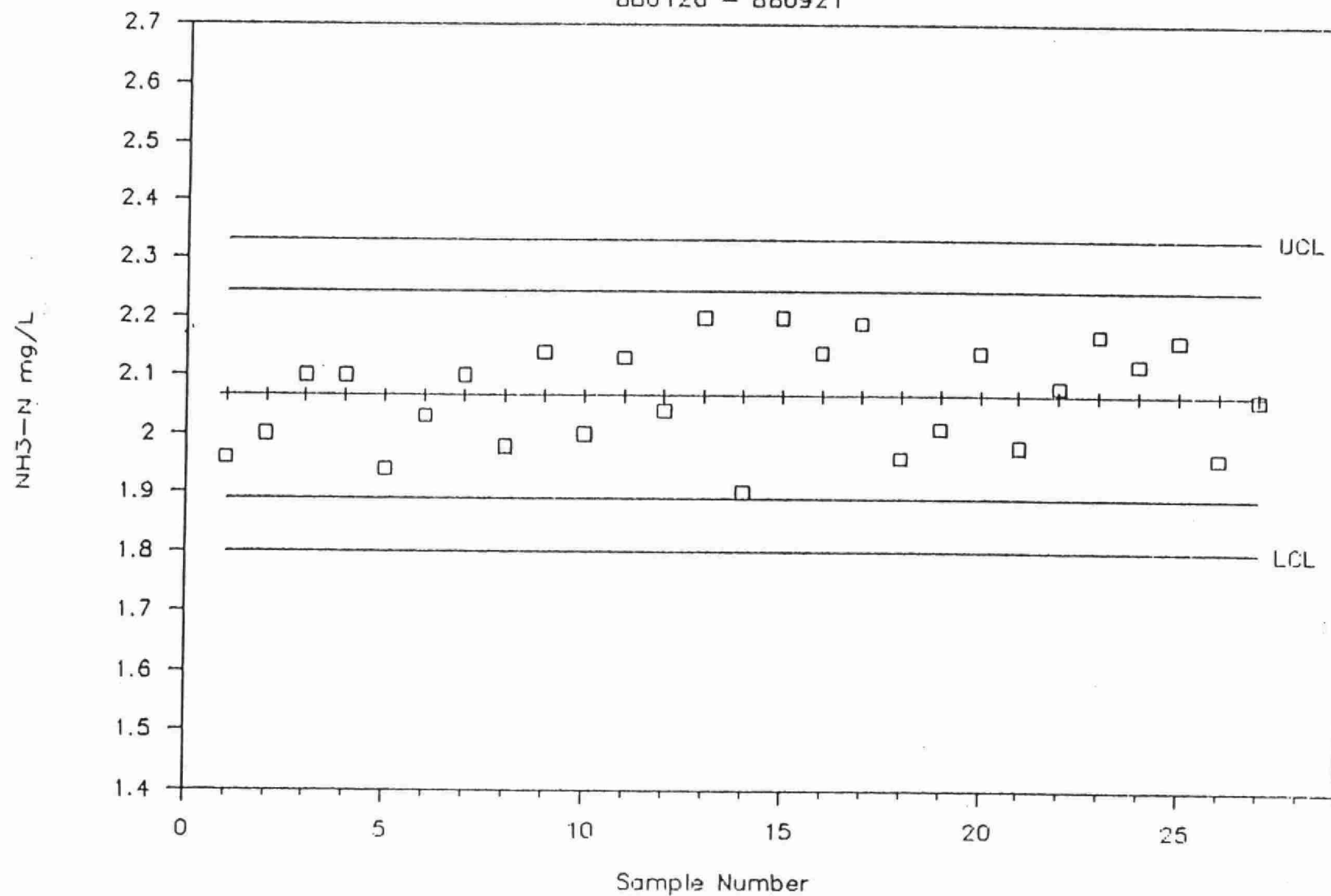
870501-880920 True Value=119 ug/g



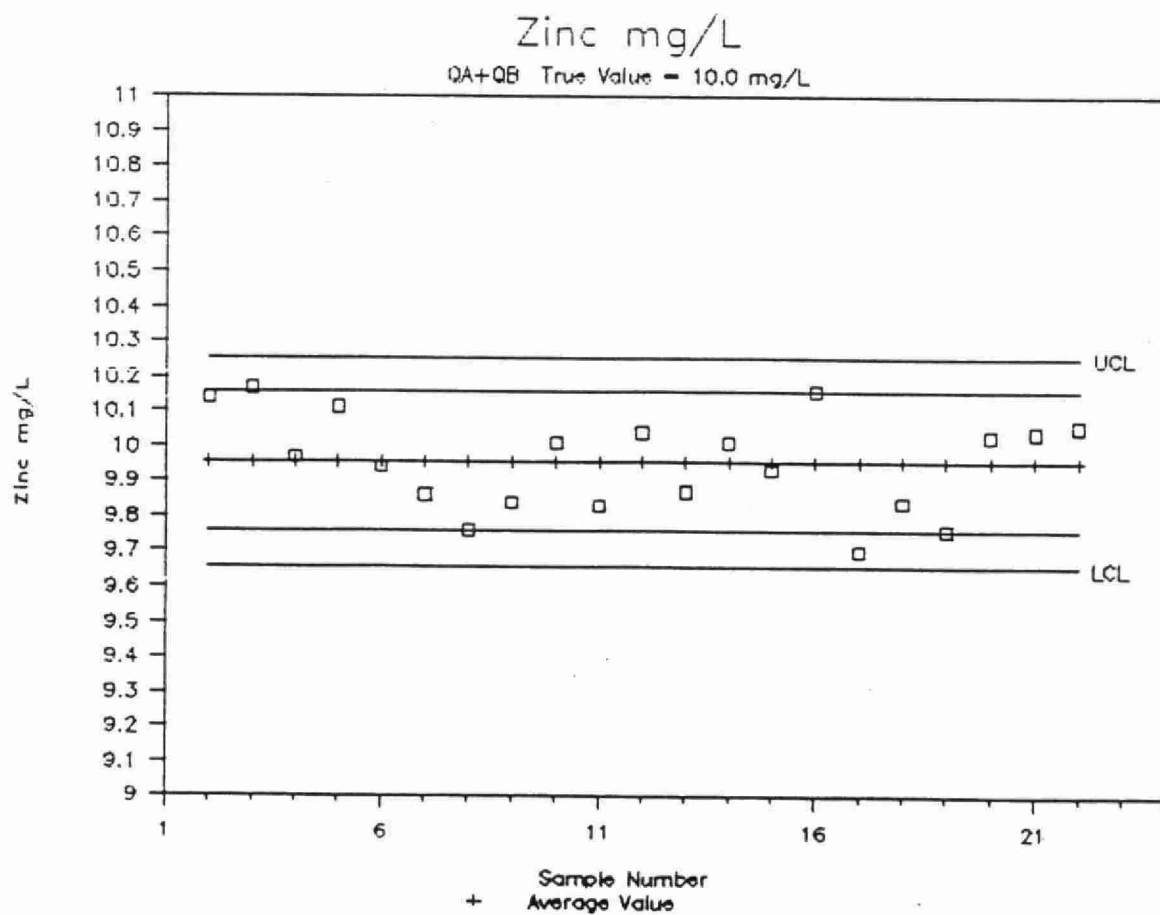
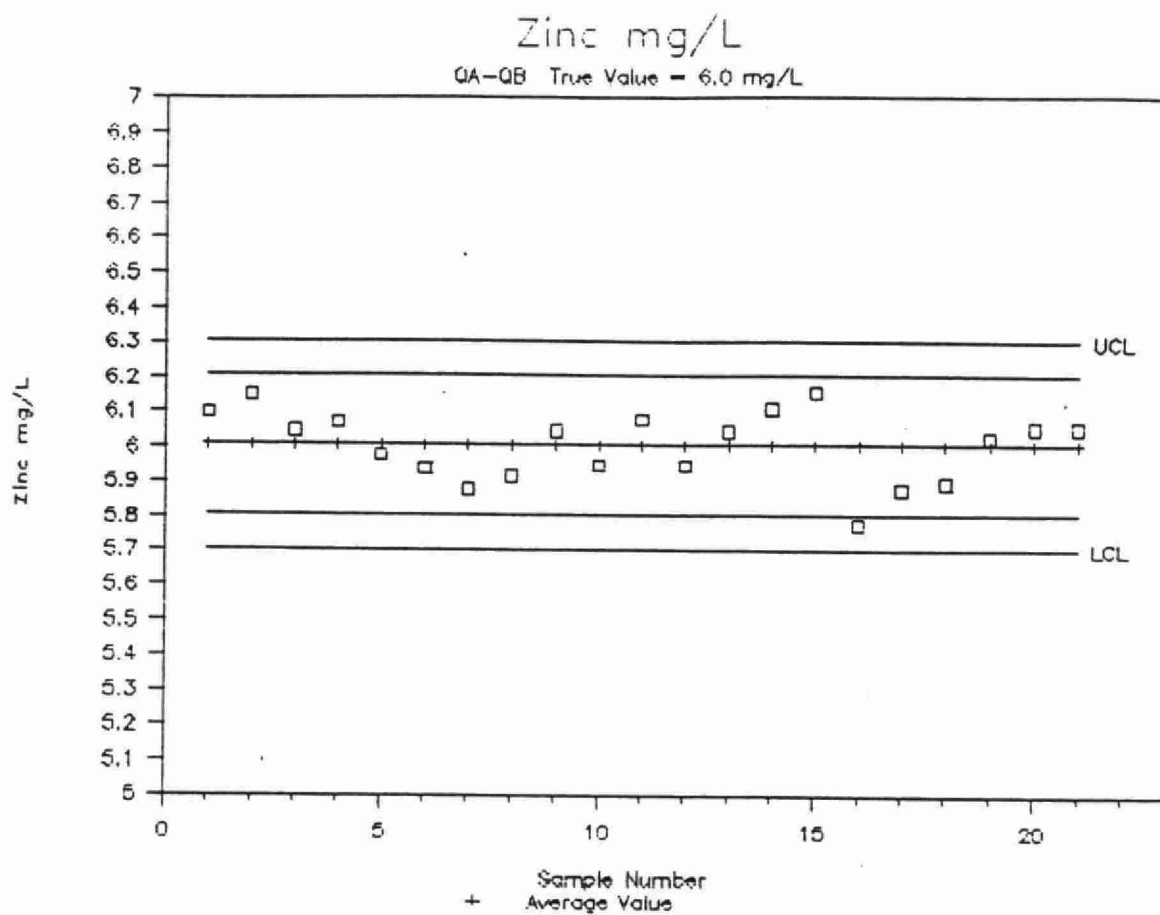
Zinc ug/g

# Ammonia Nitrogen WP486 #1

880126 - 880921

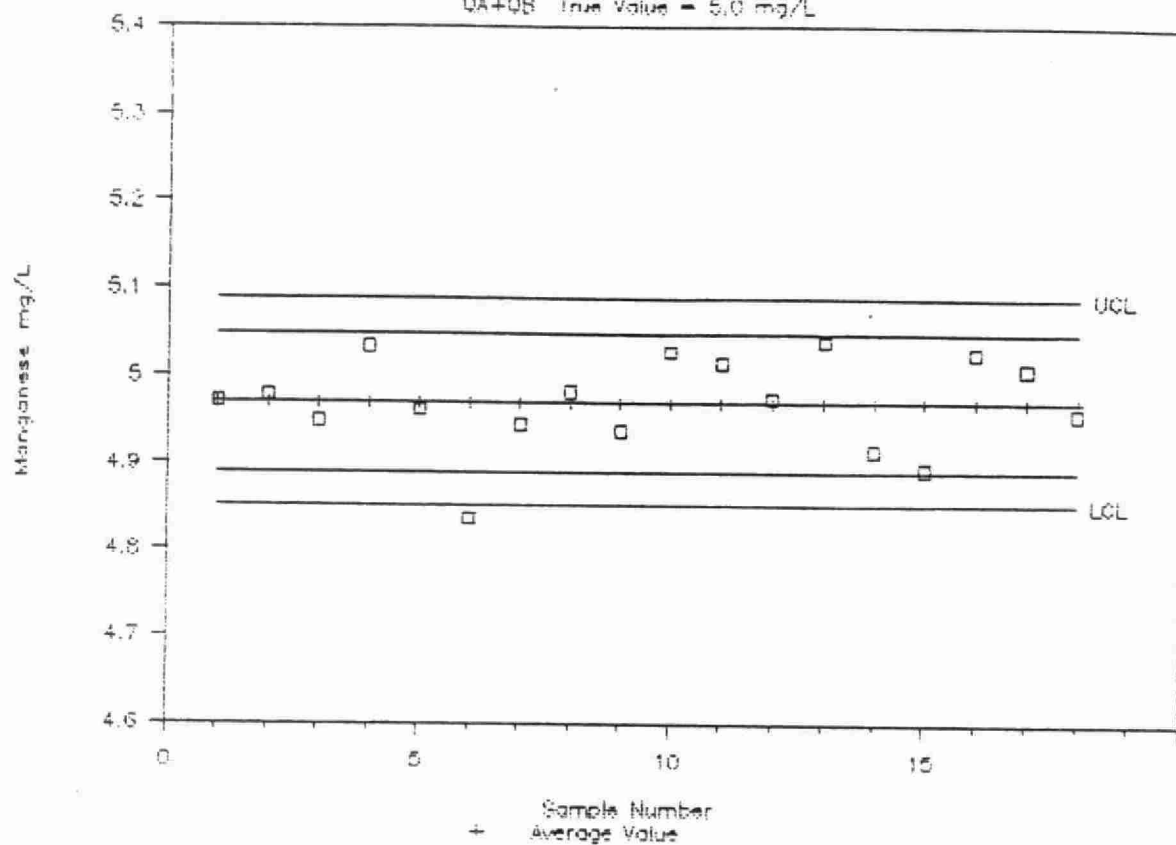


SELECTED CONTROL CHARTS FOR  
CALIBRATION CONTROL SAMPLES ANALYZED  
WITH ALGOMA-STELCO SAMPLES



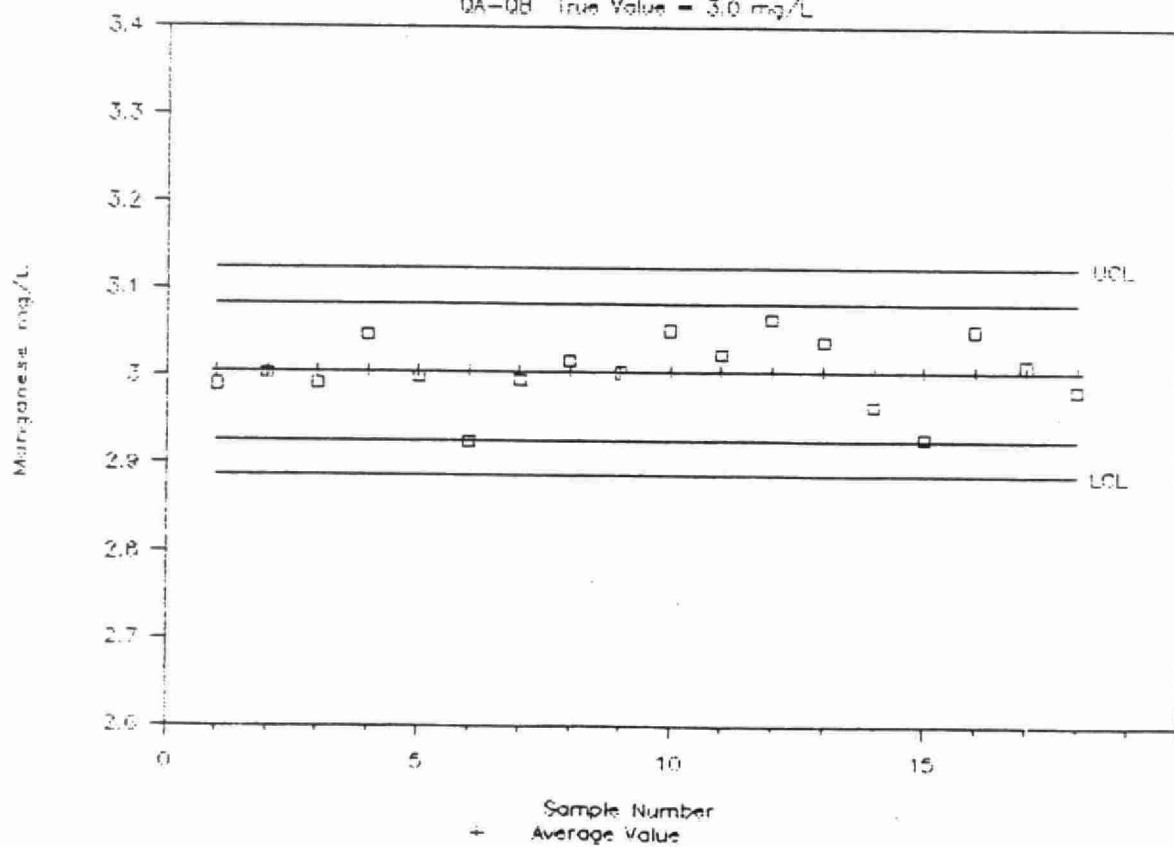
# Manganese mg/L

QA+QB True Value = 5.0 mg/L

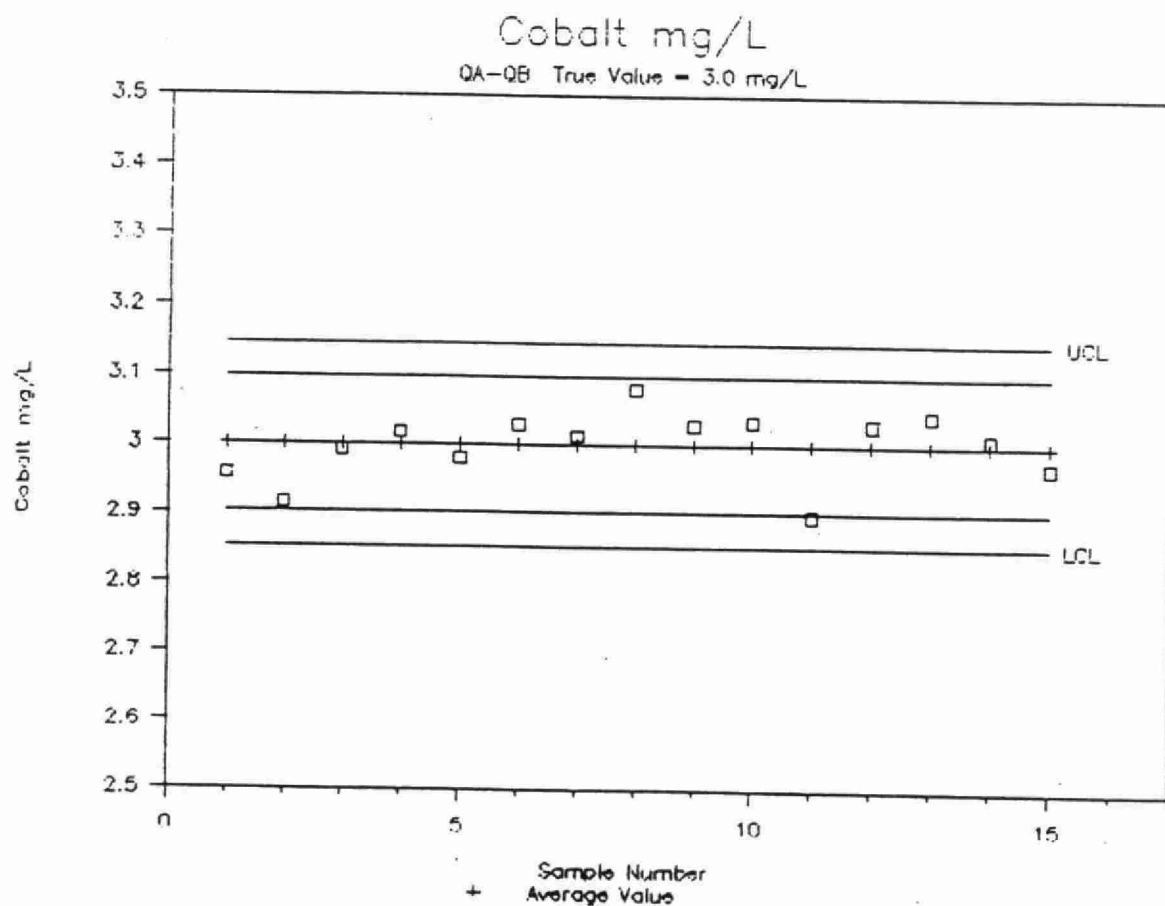
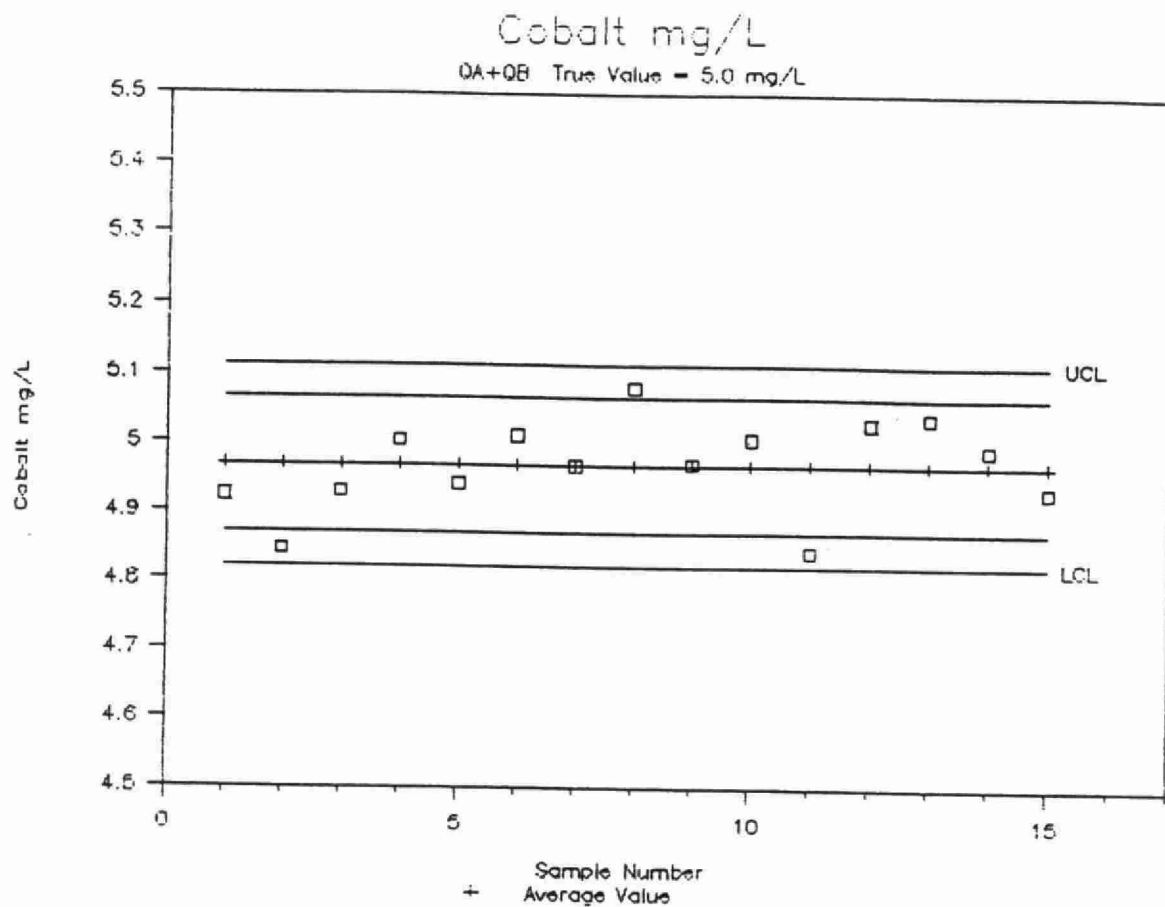


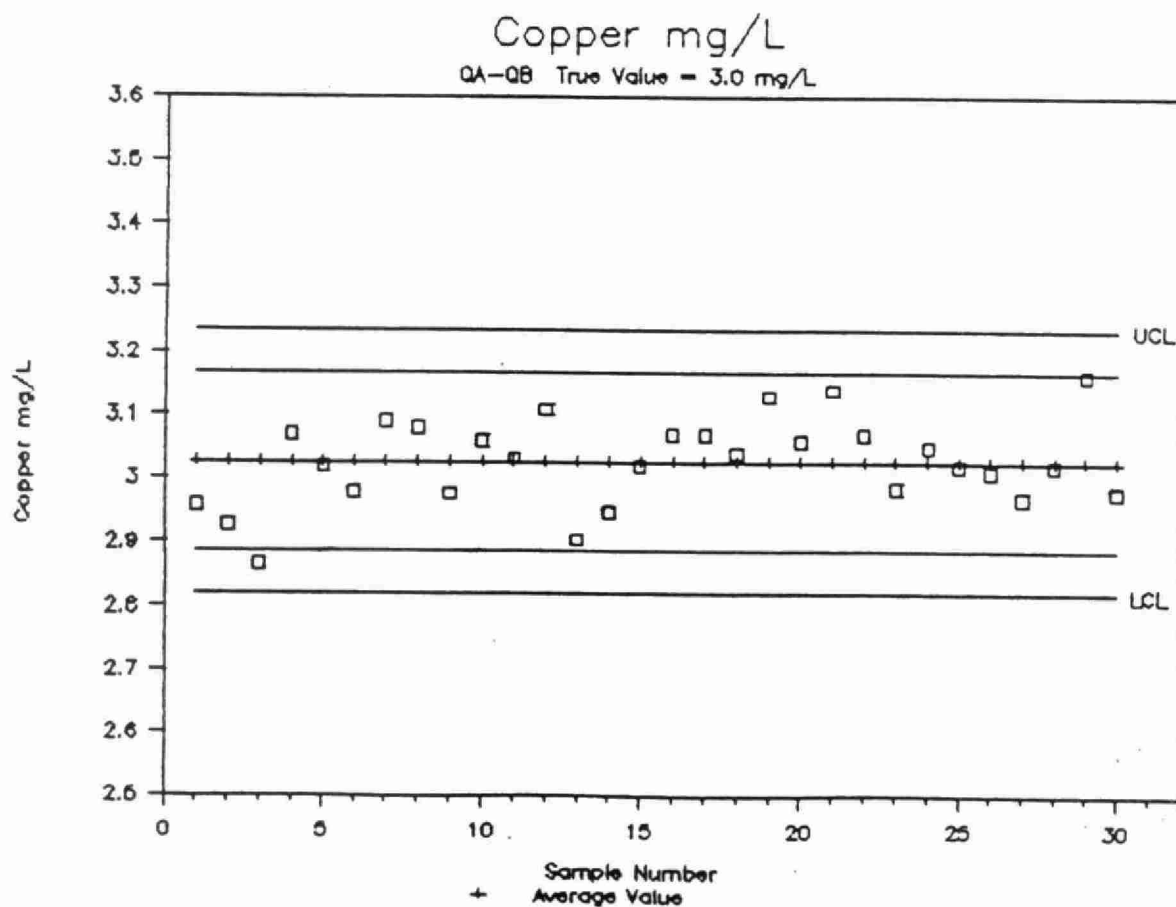
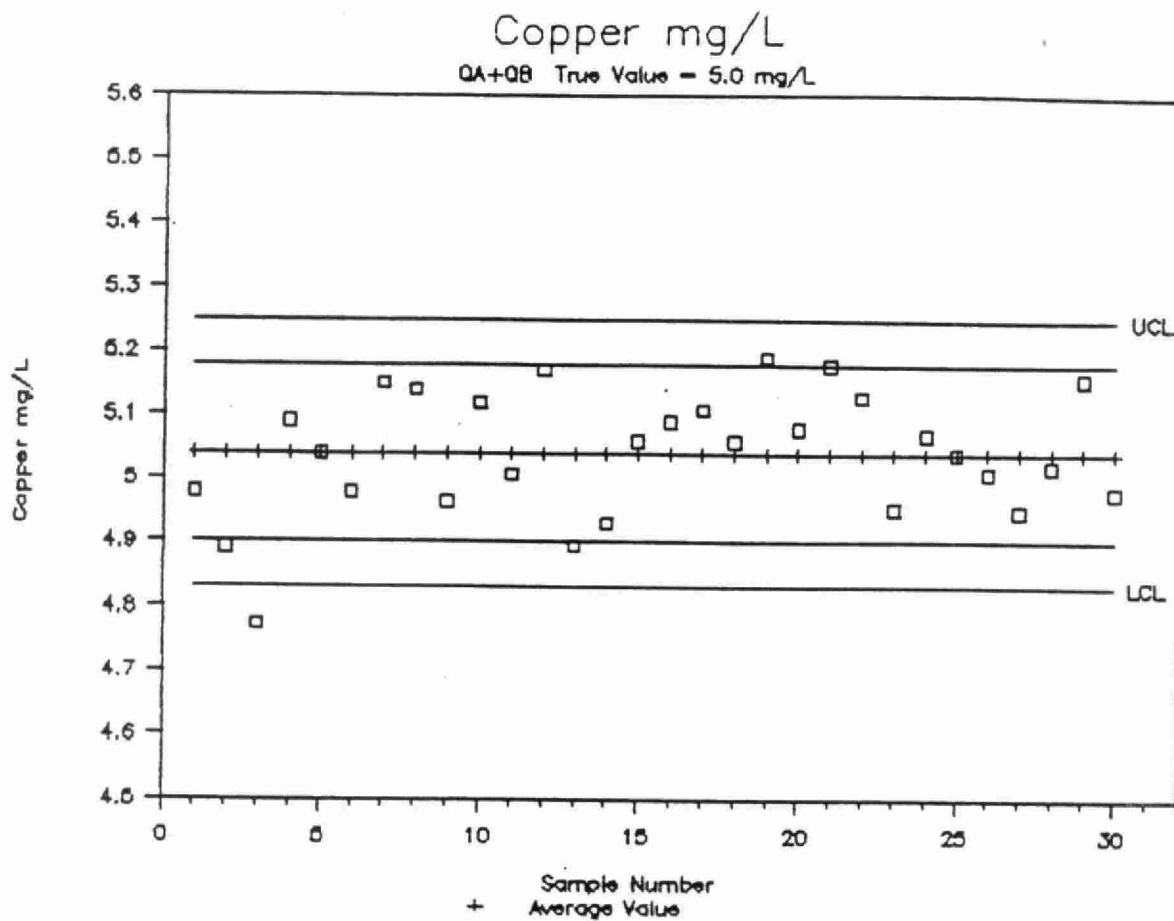
# Manganese mg/L

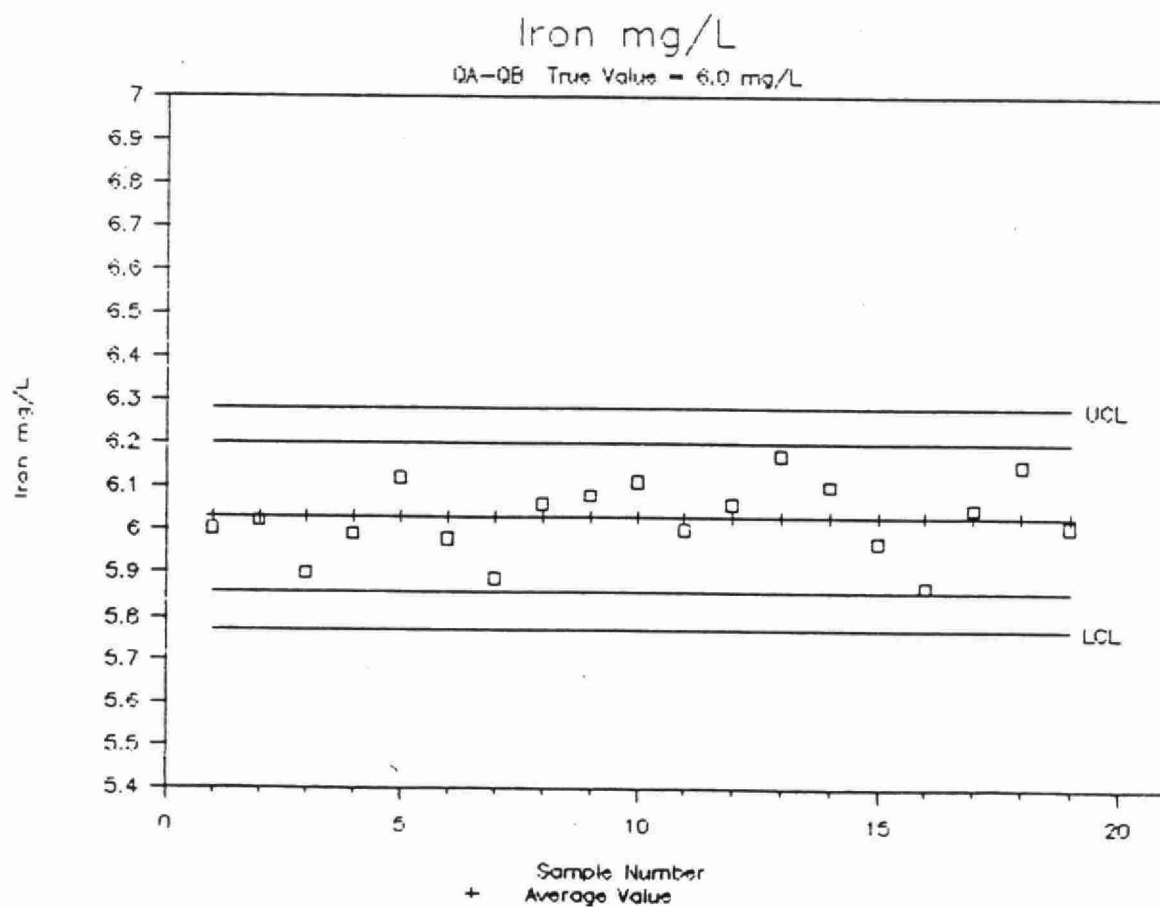
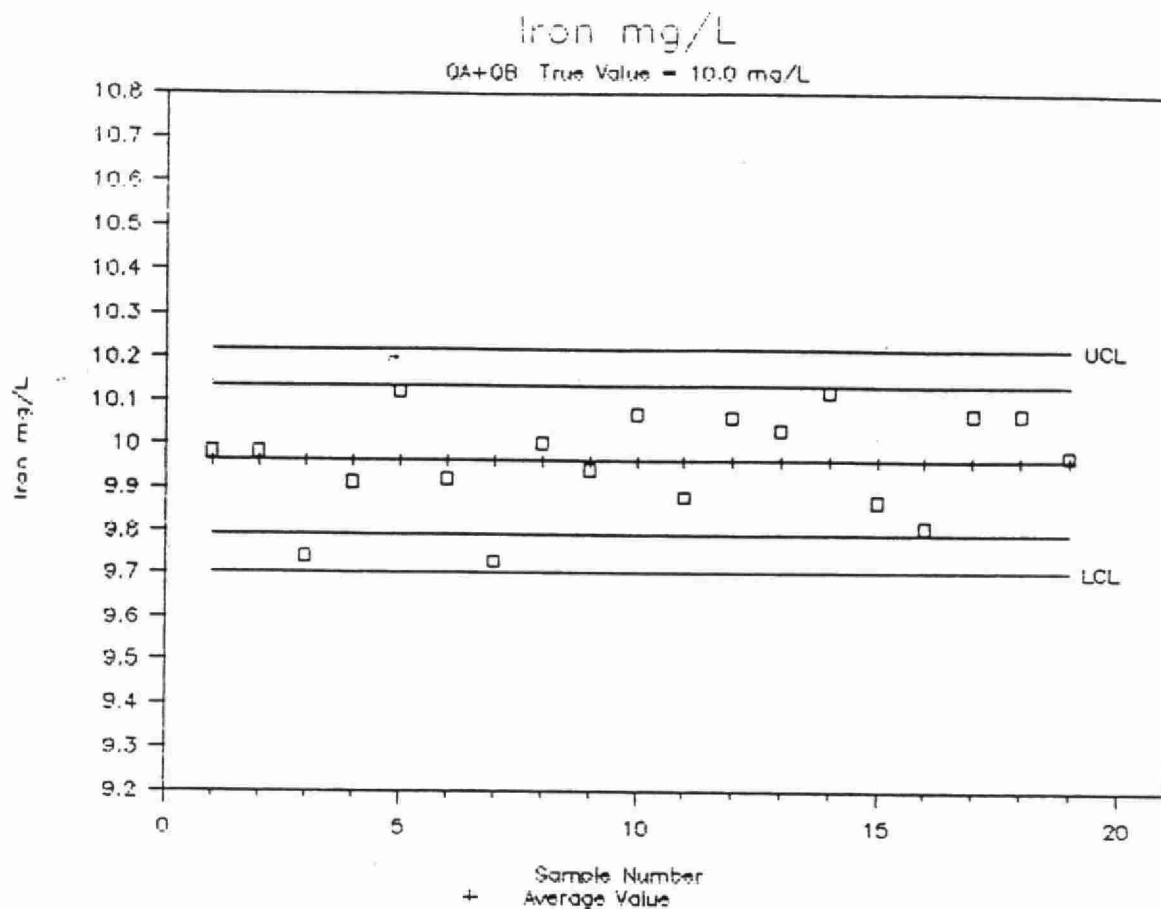
QA+QB True Value = 3.0 mg/L

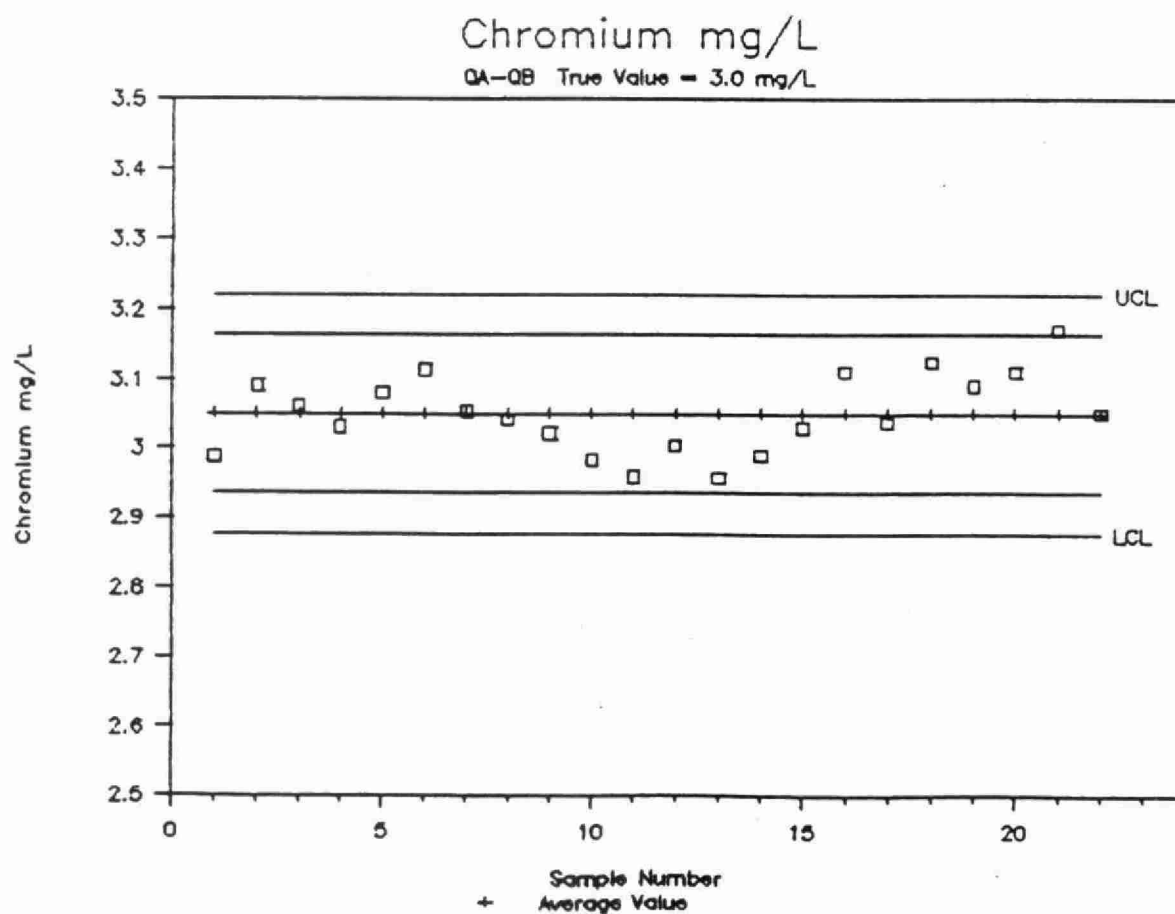
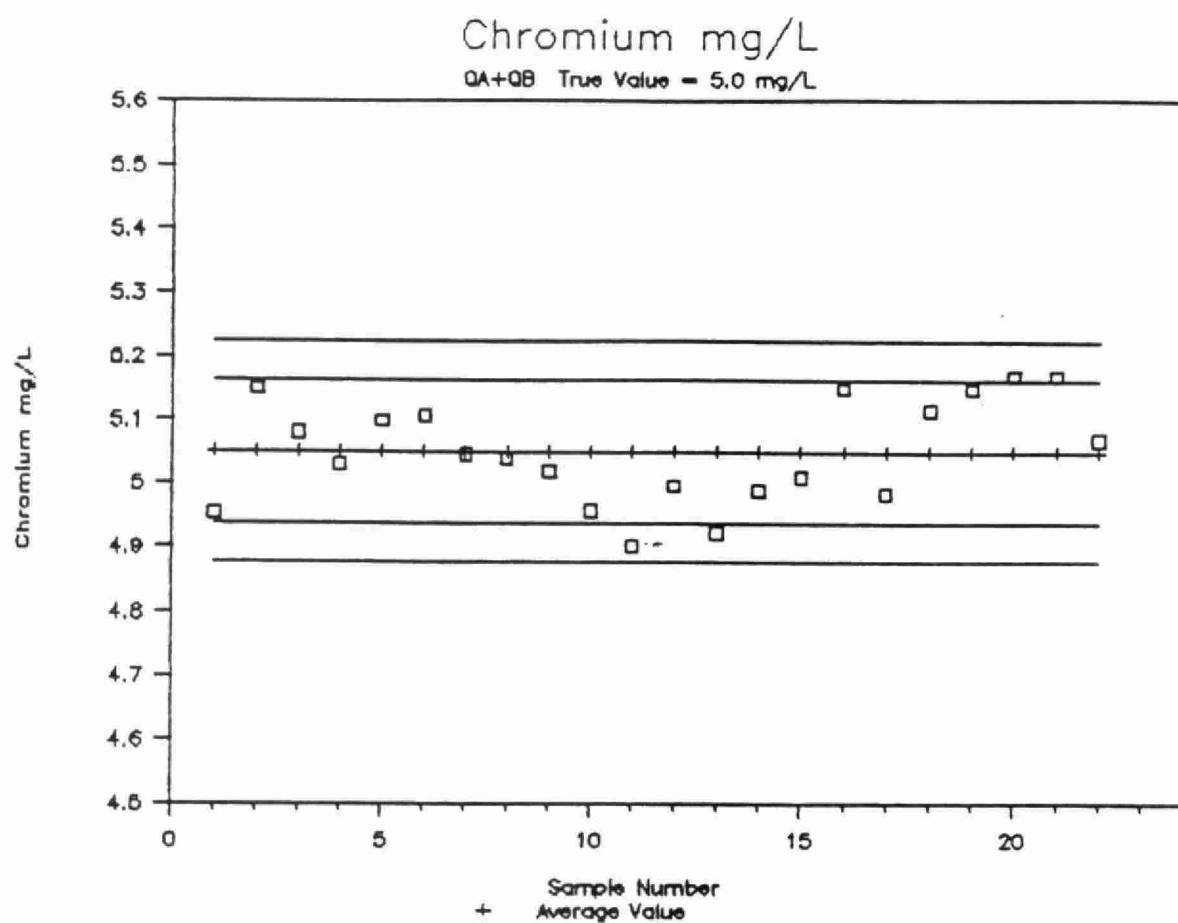


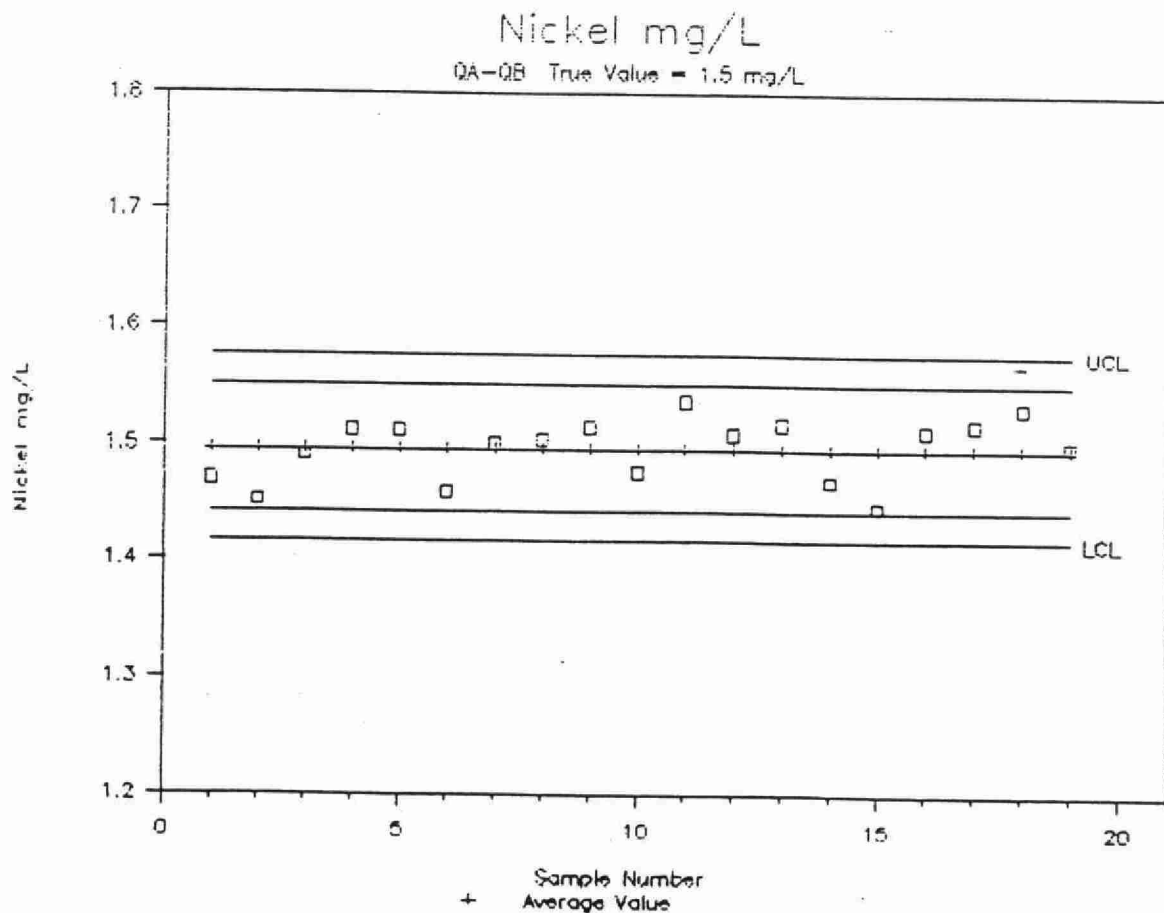
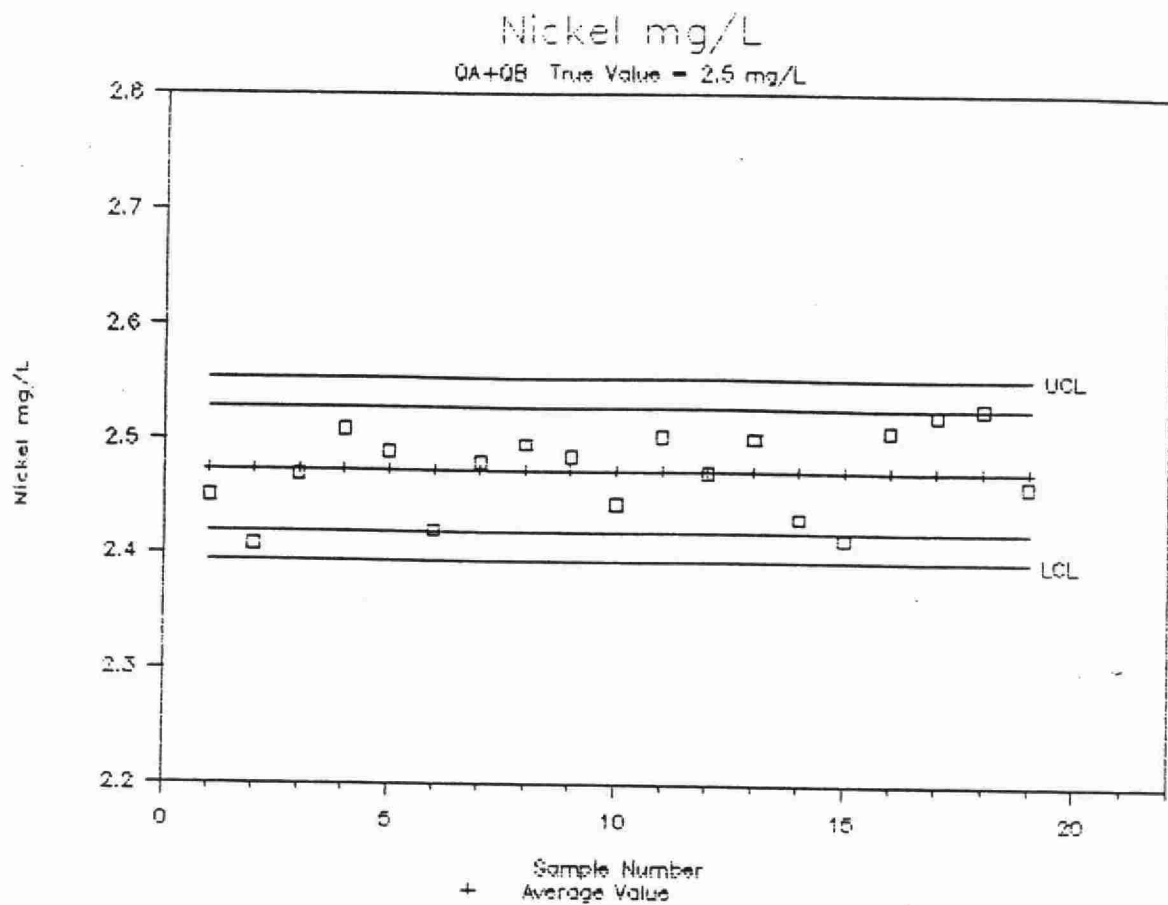


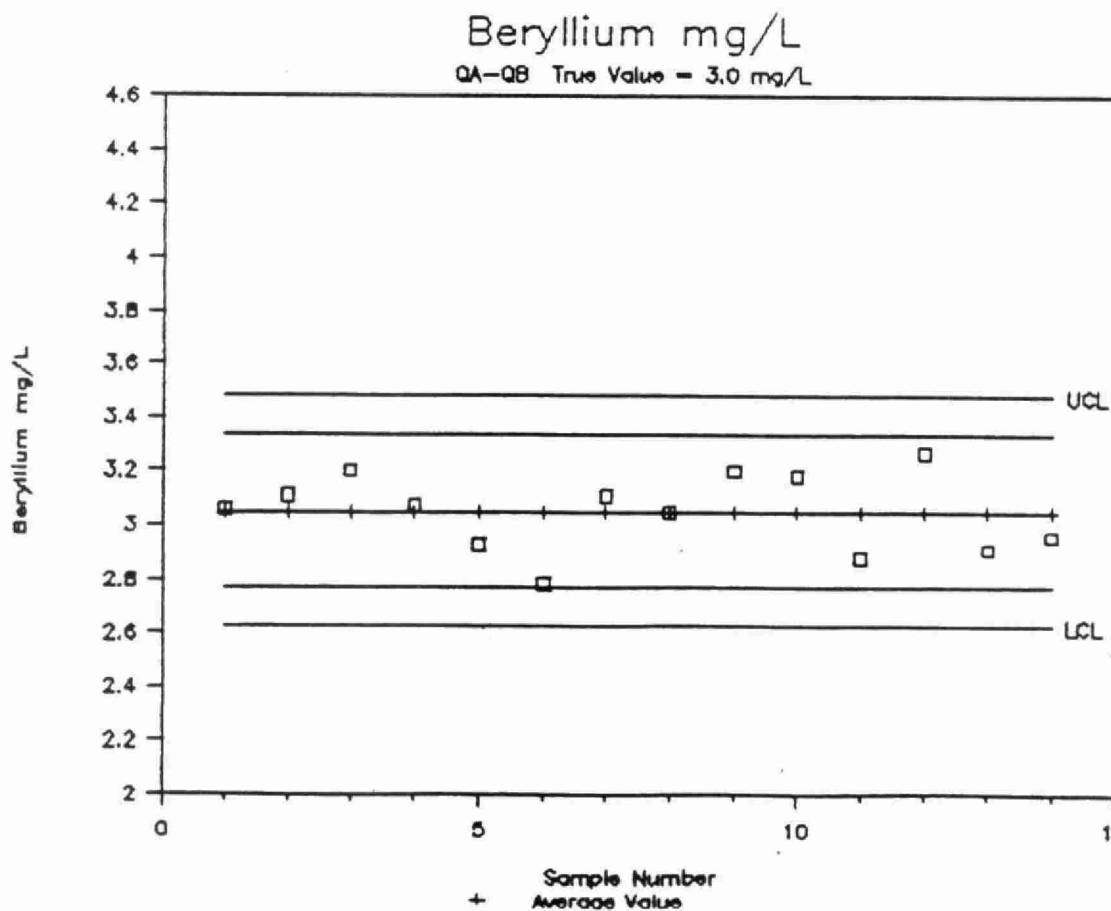
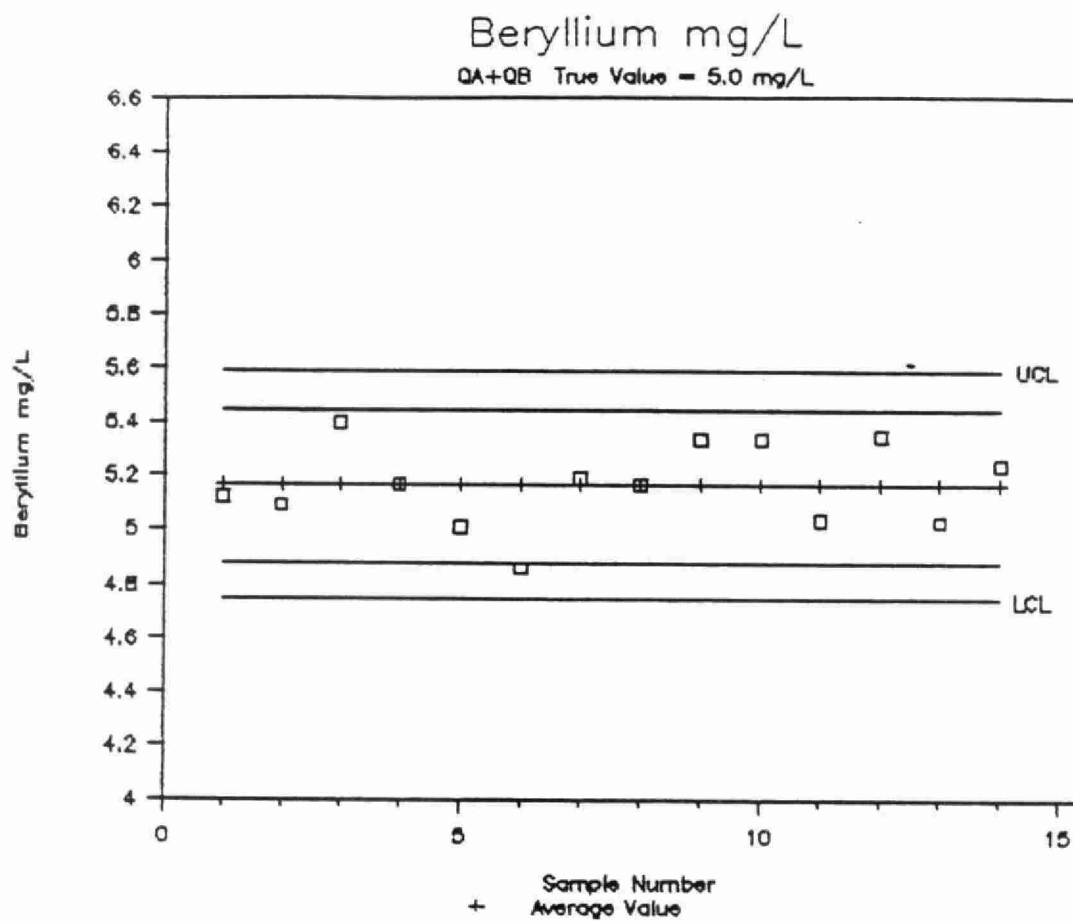






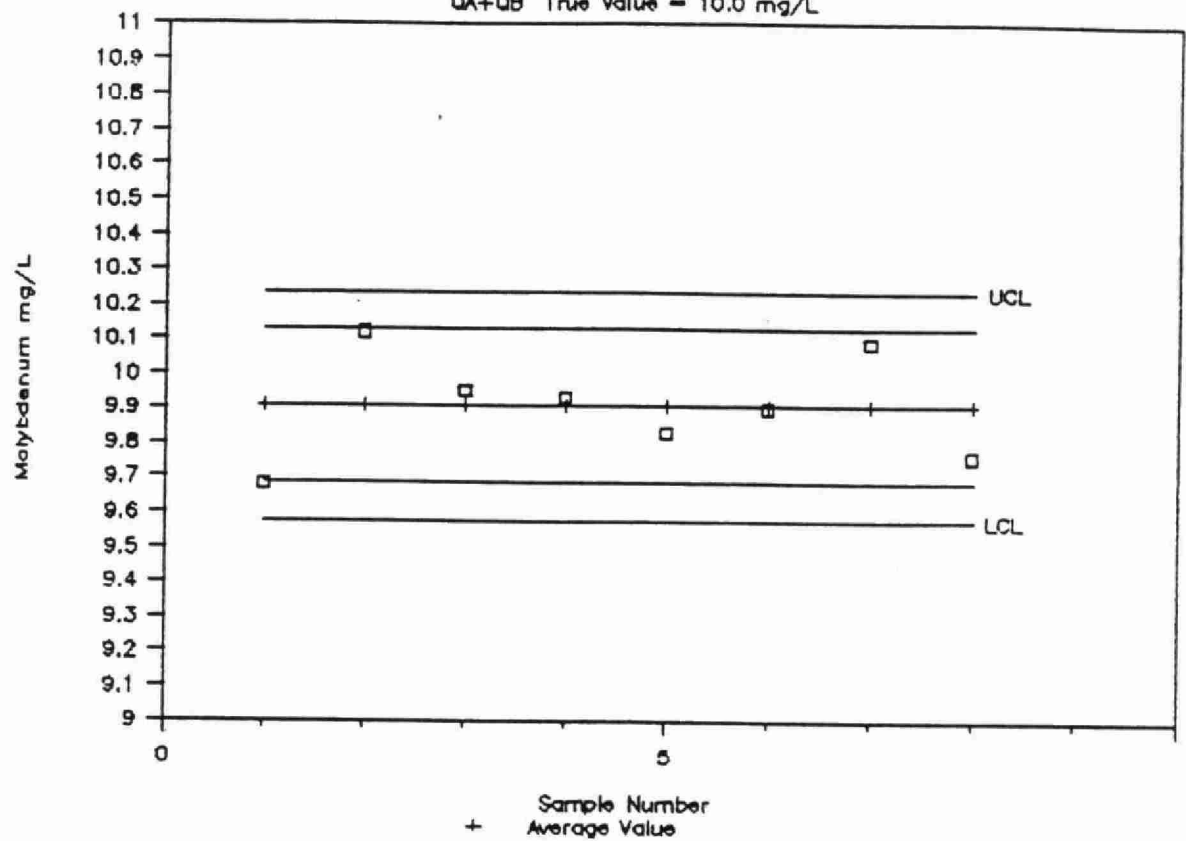






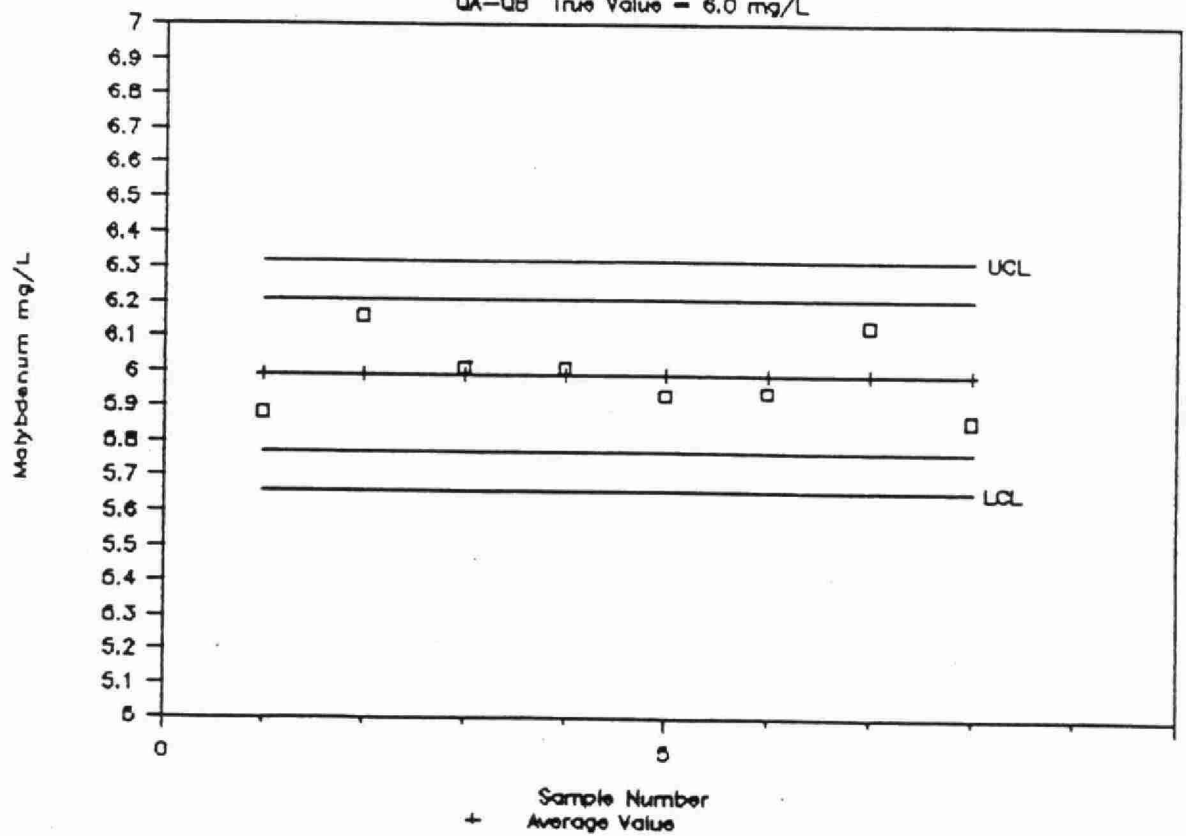
# Molybdenum mg/L

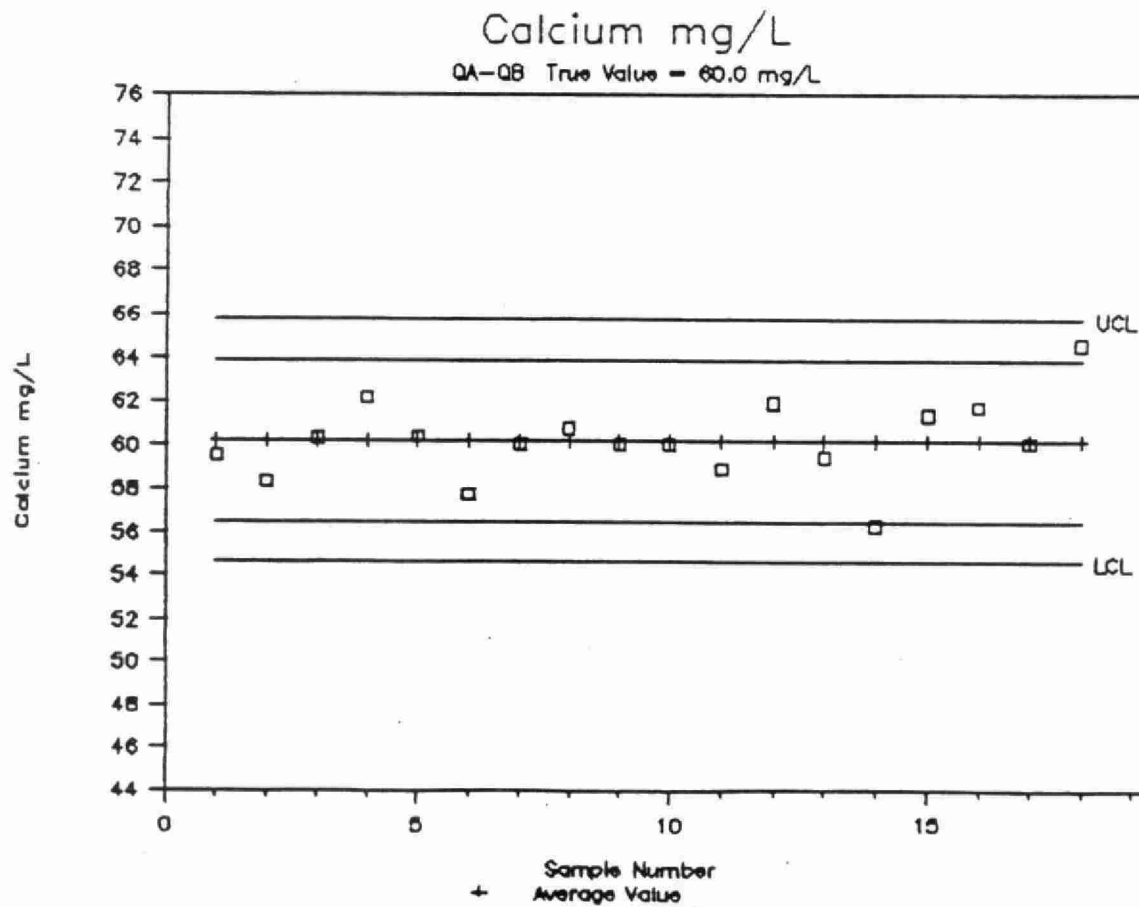
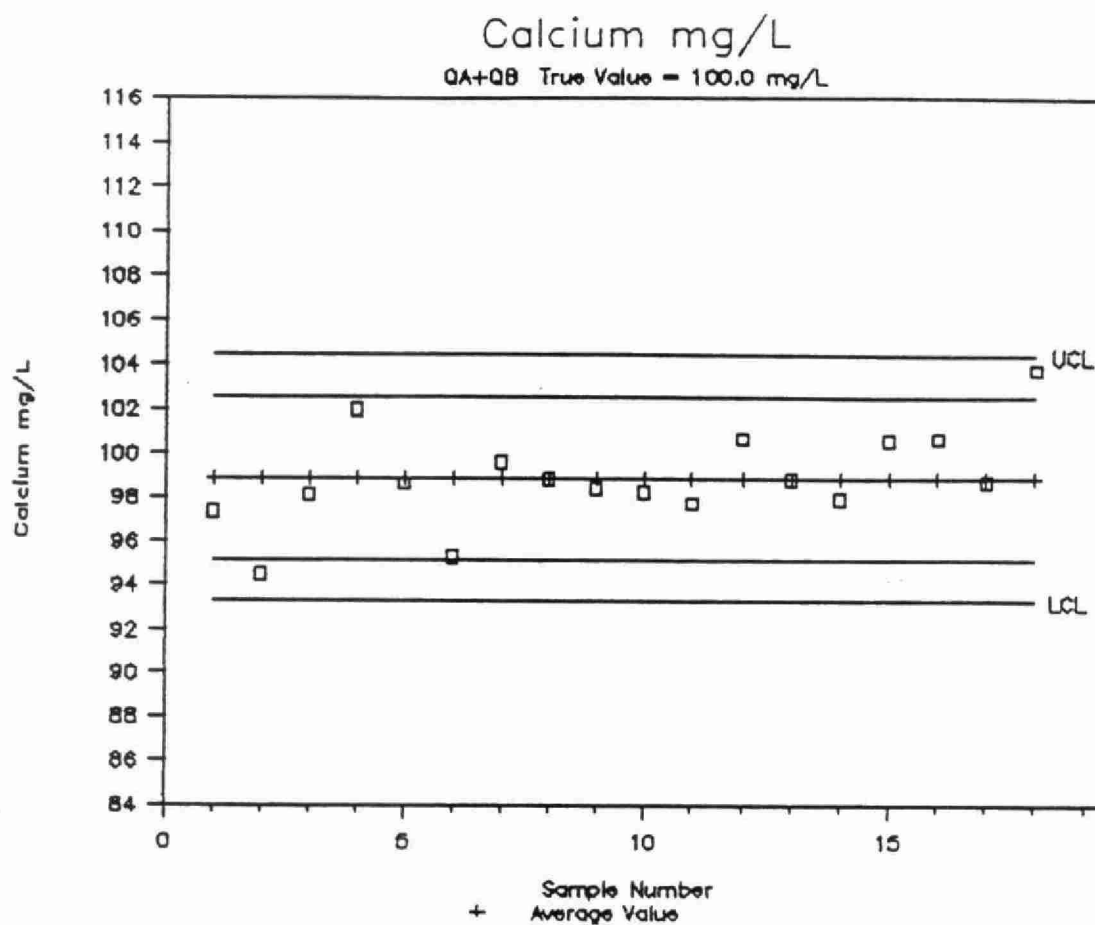
QA+QB True Value = 10.0 mg/L



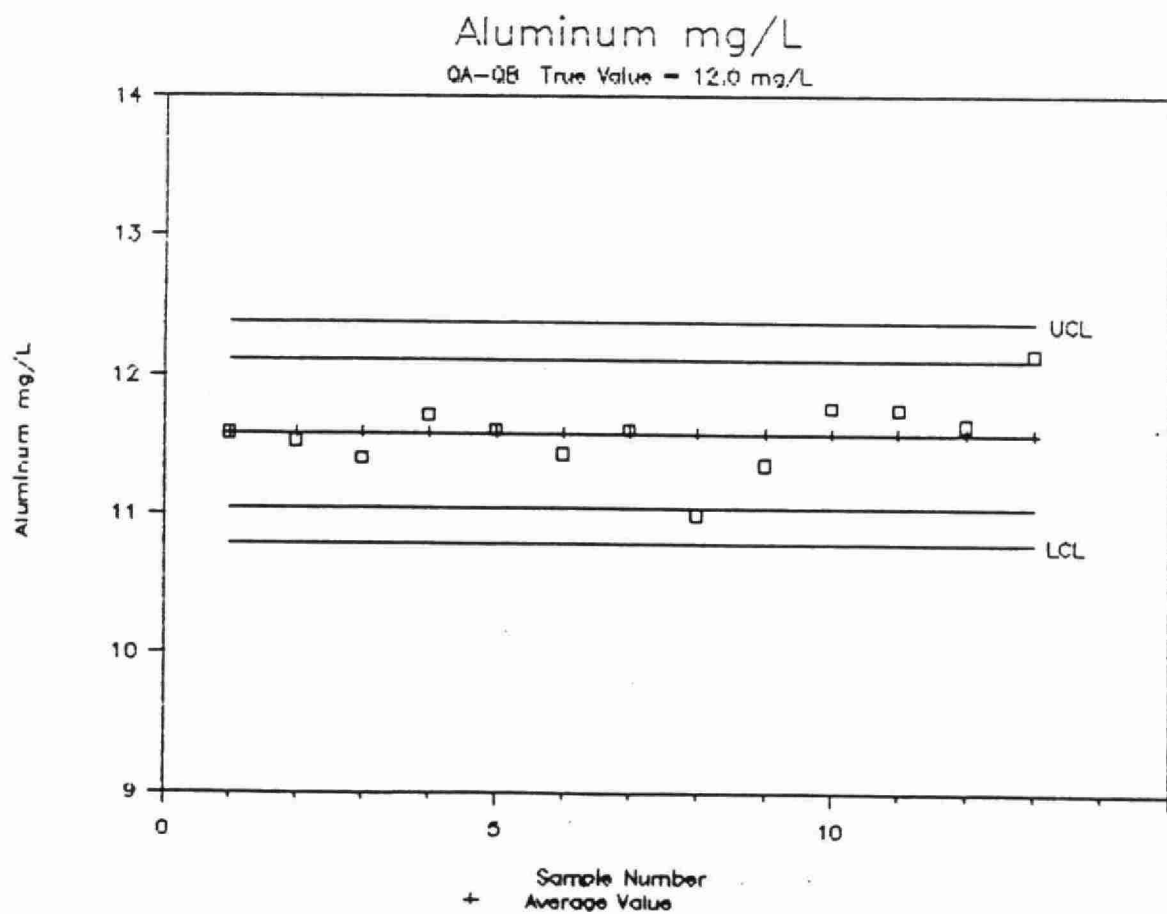
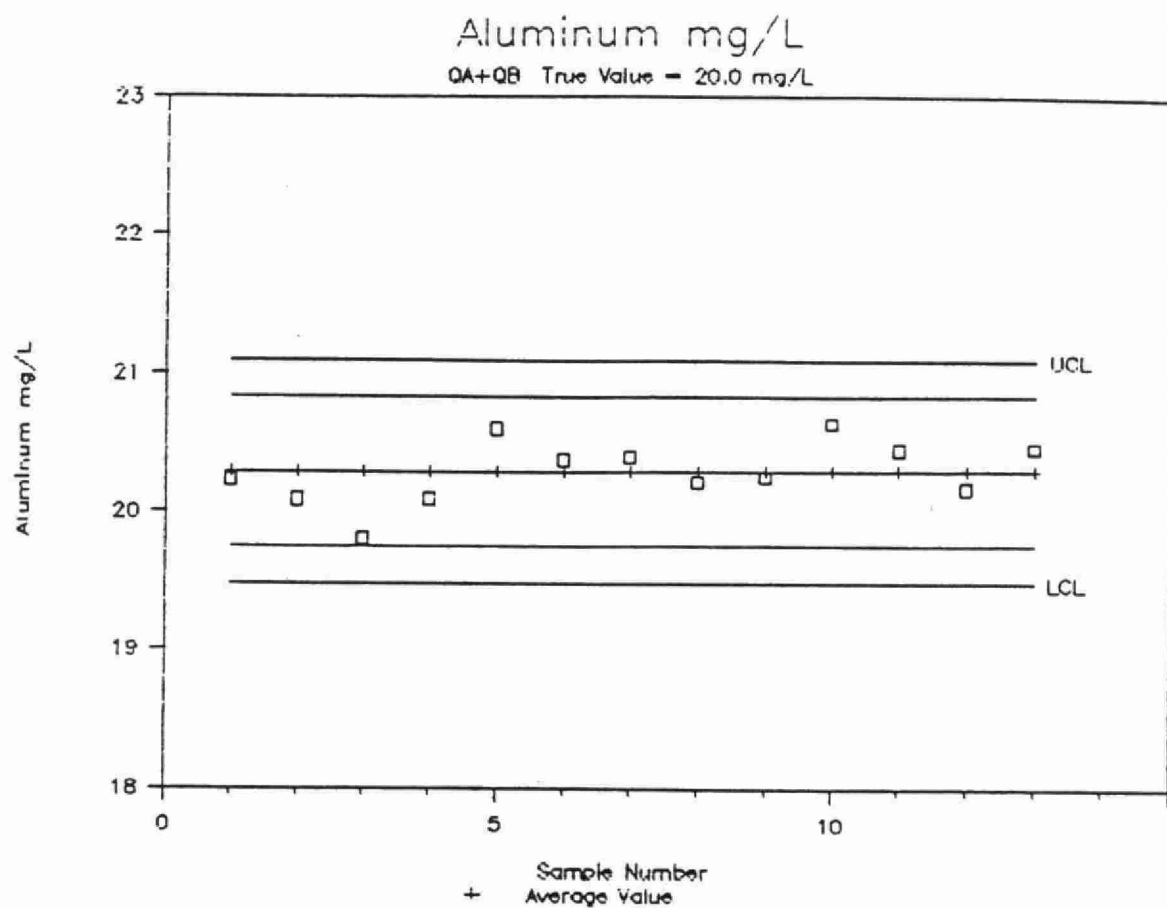
# Molybdenum mg/L

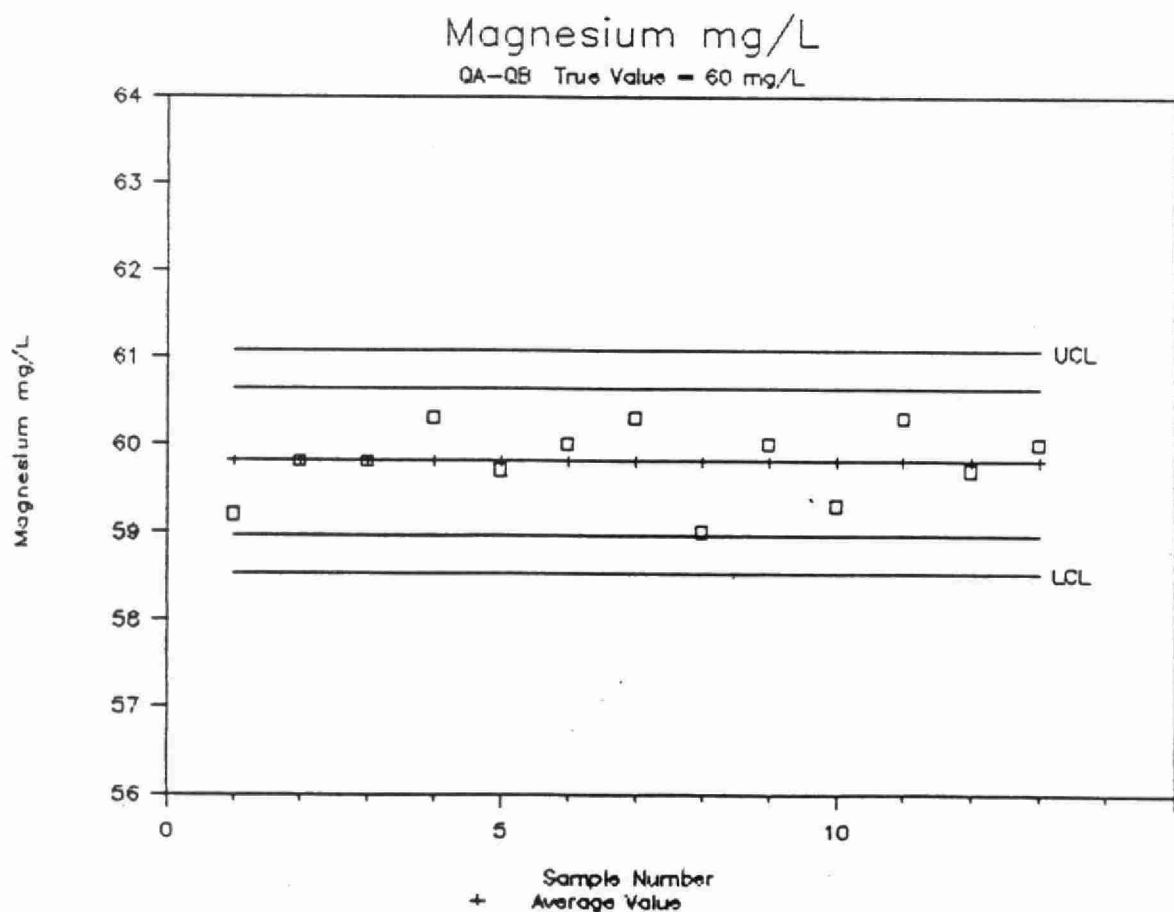
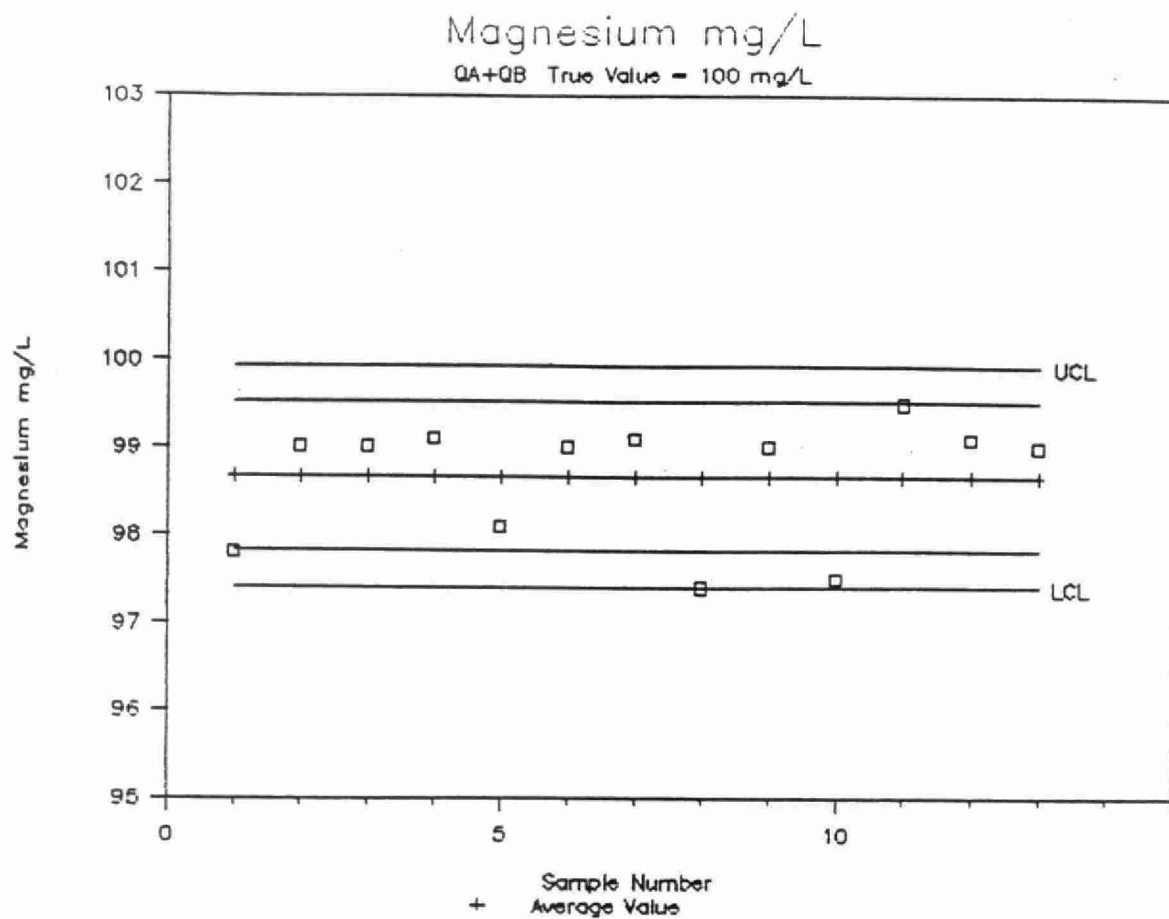
QA-QB True Value = 6.0 mg/L

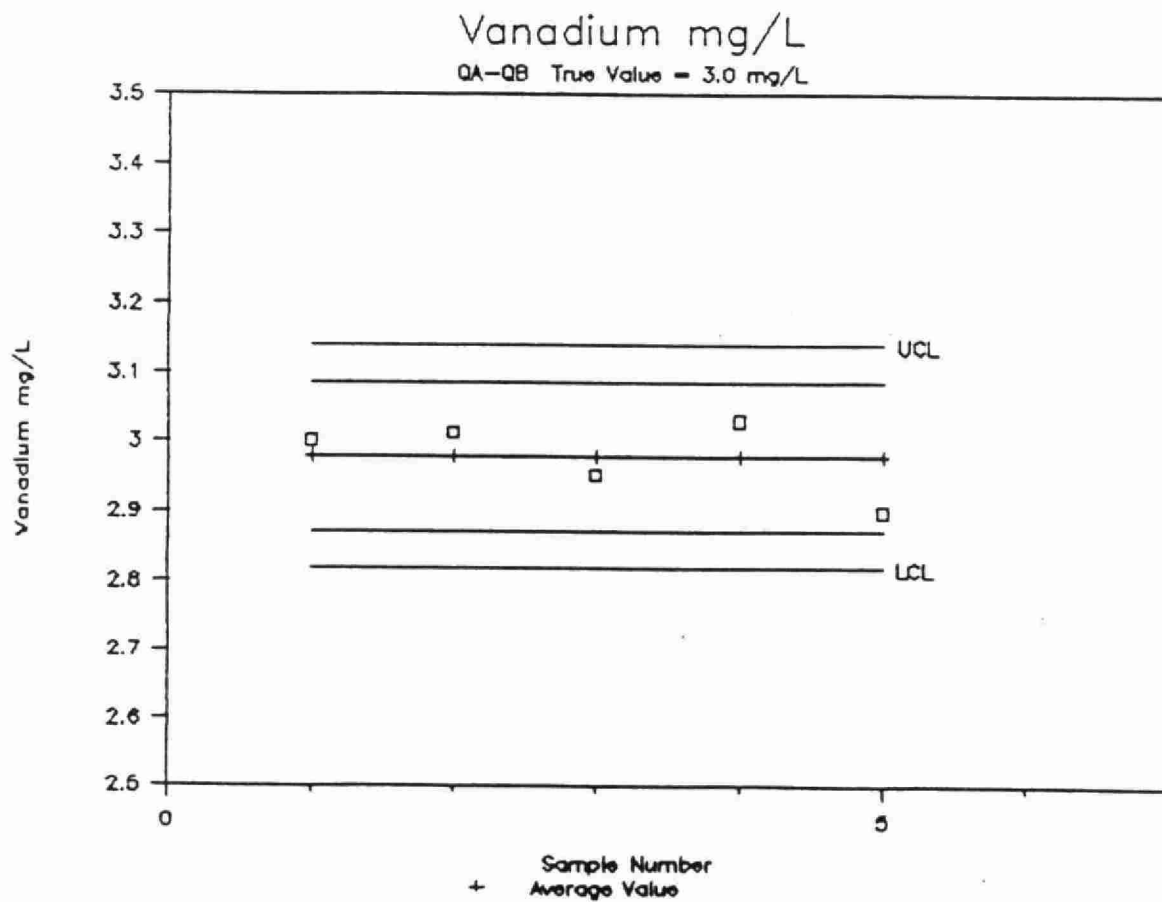
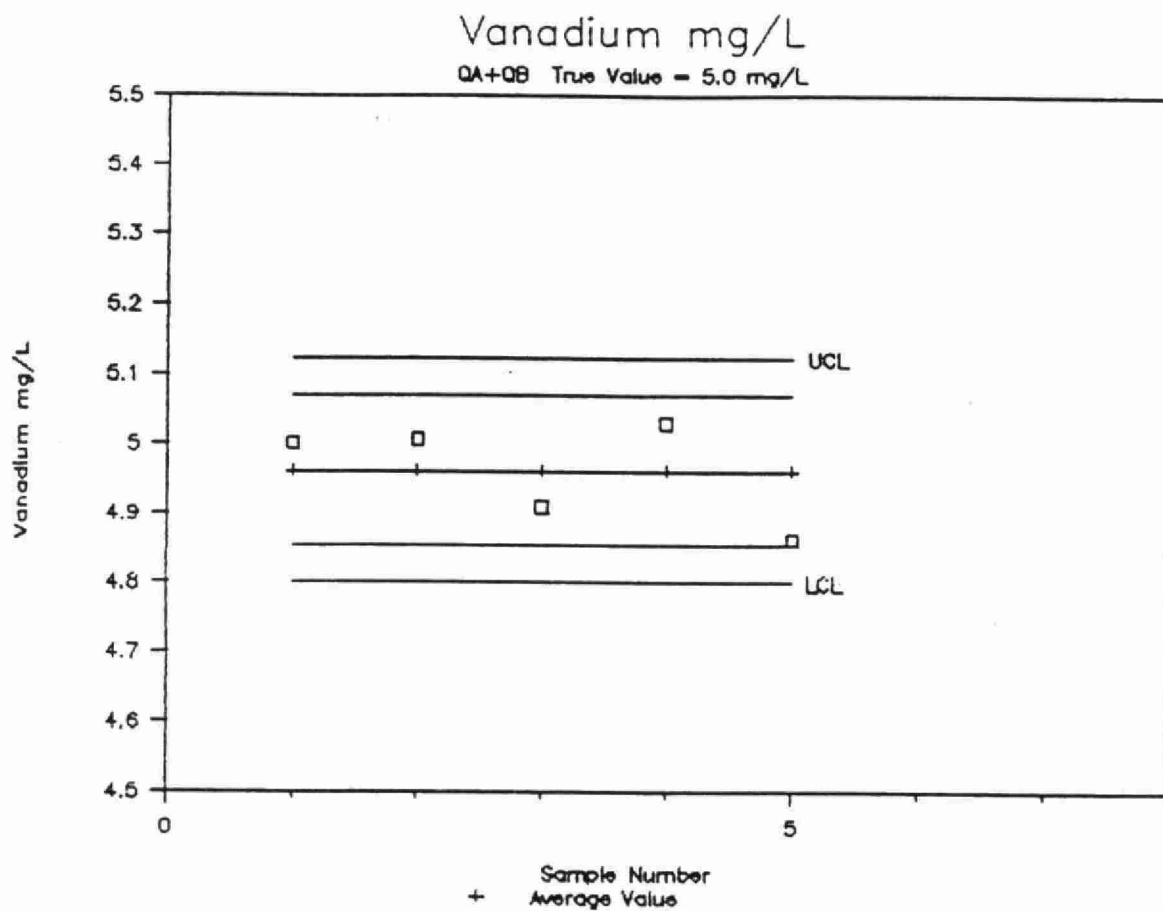


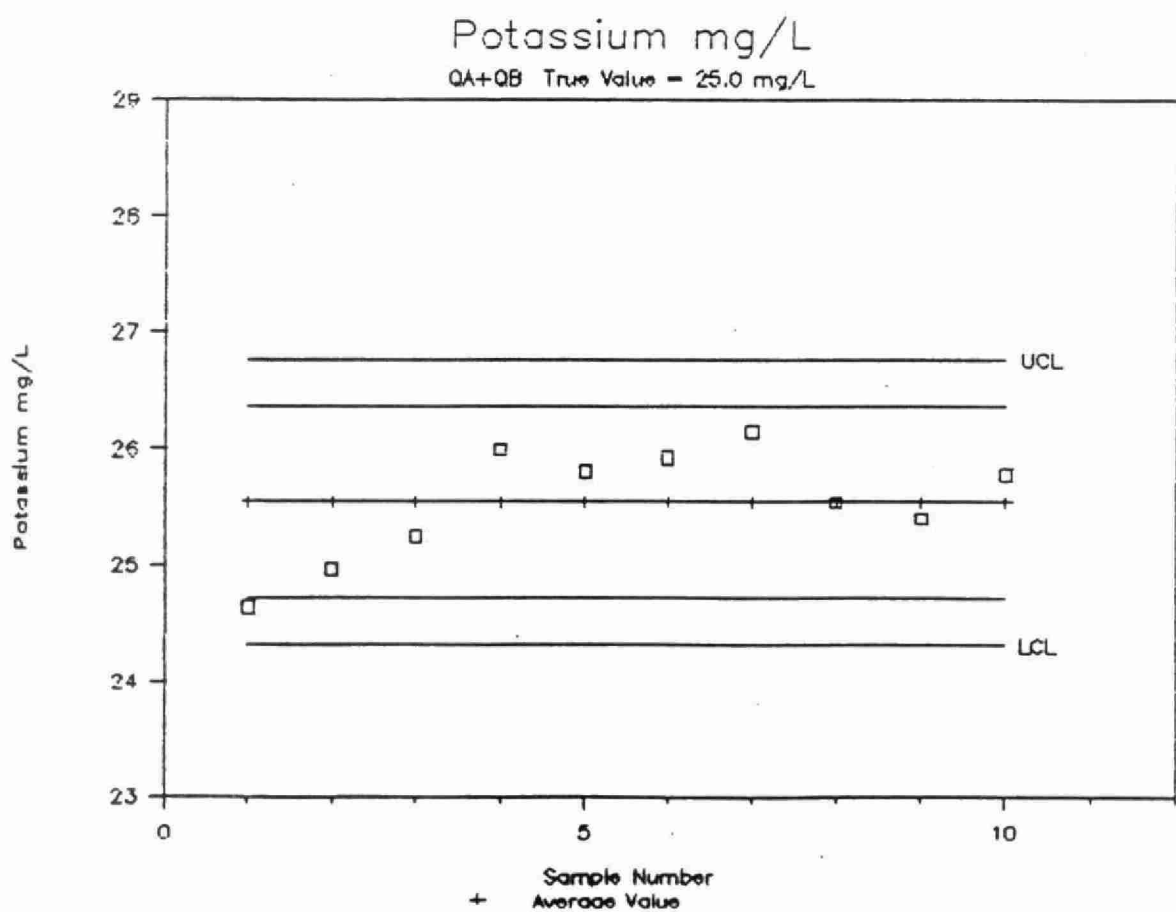
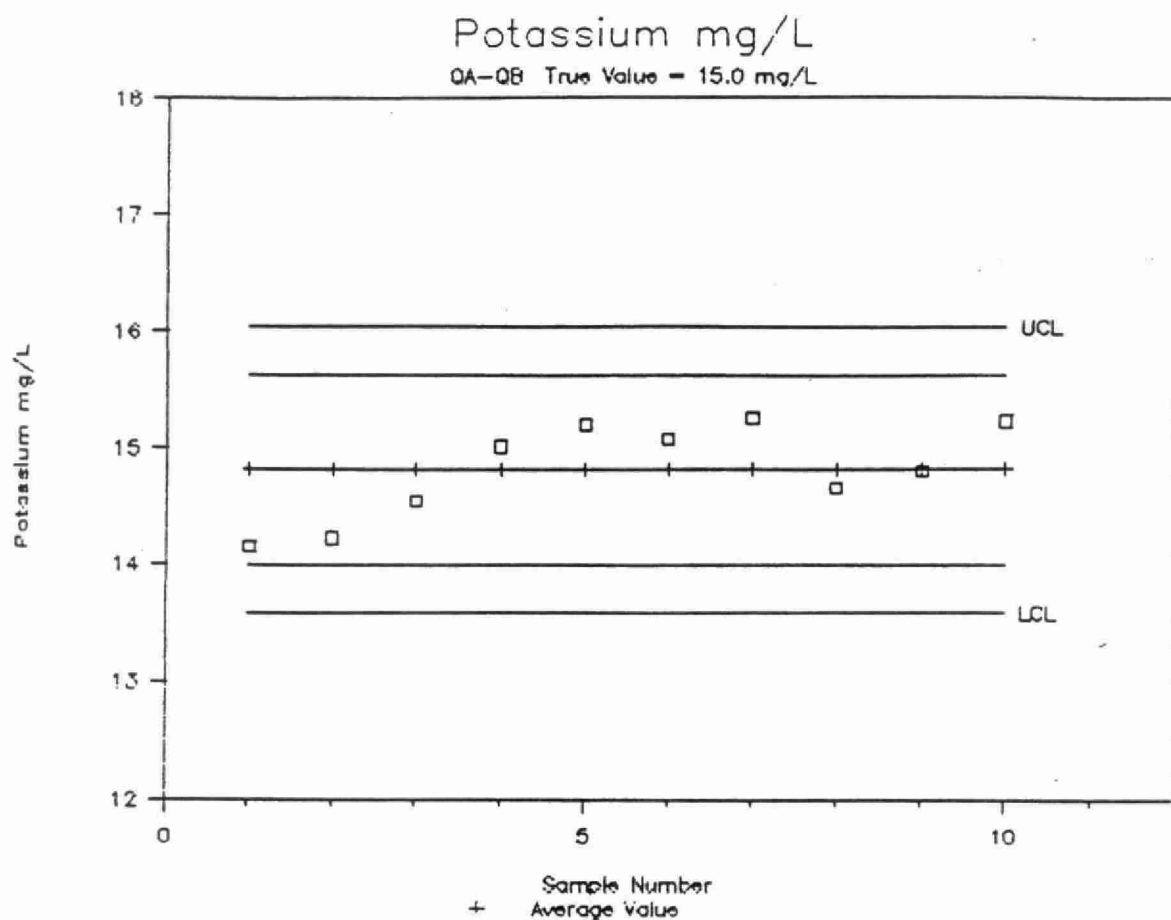


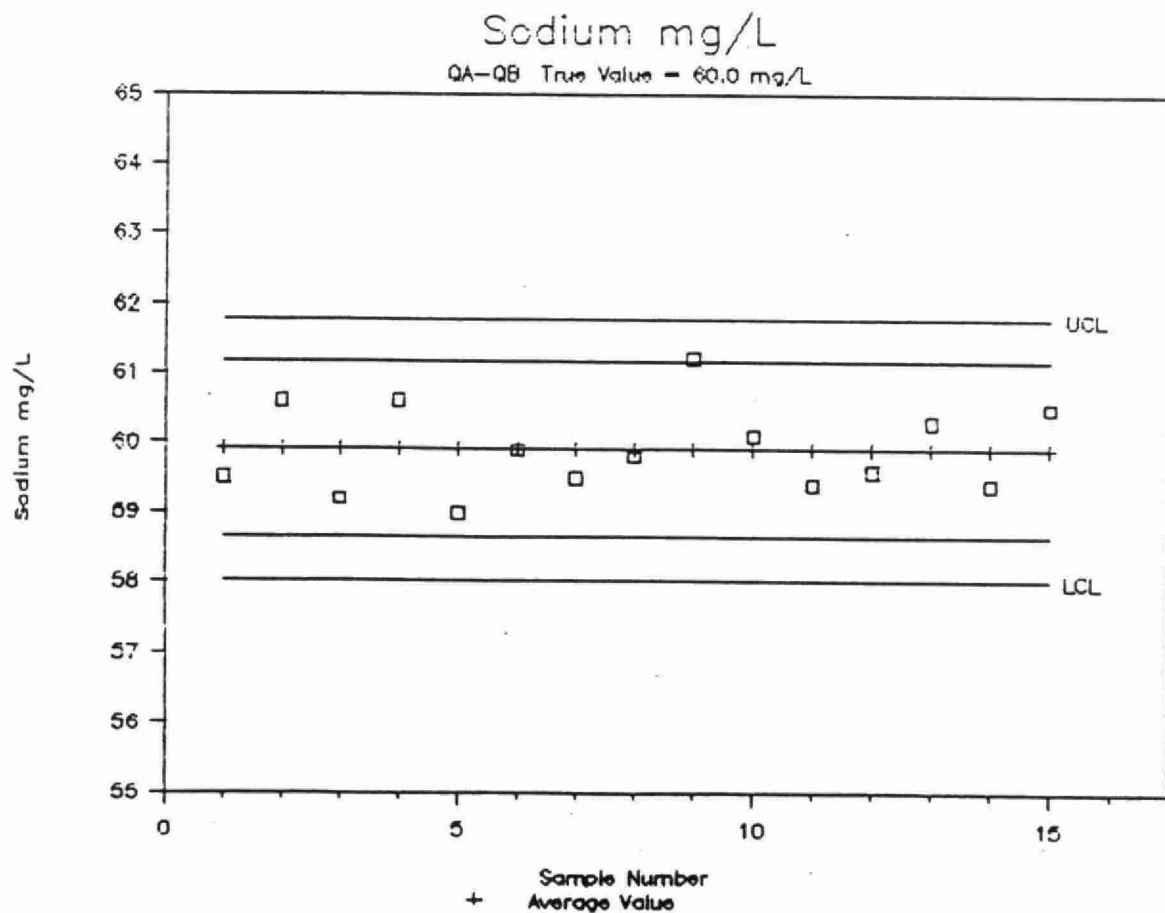
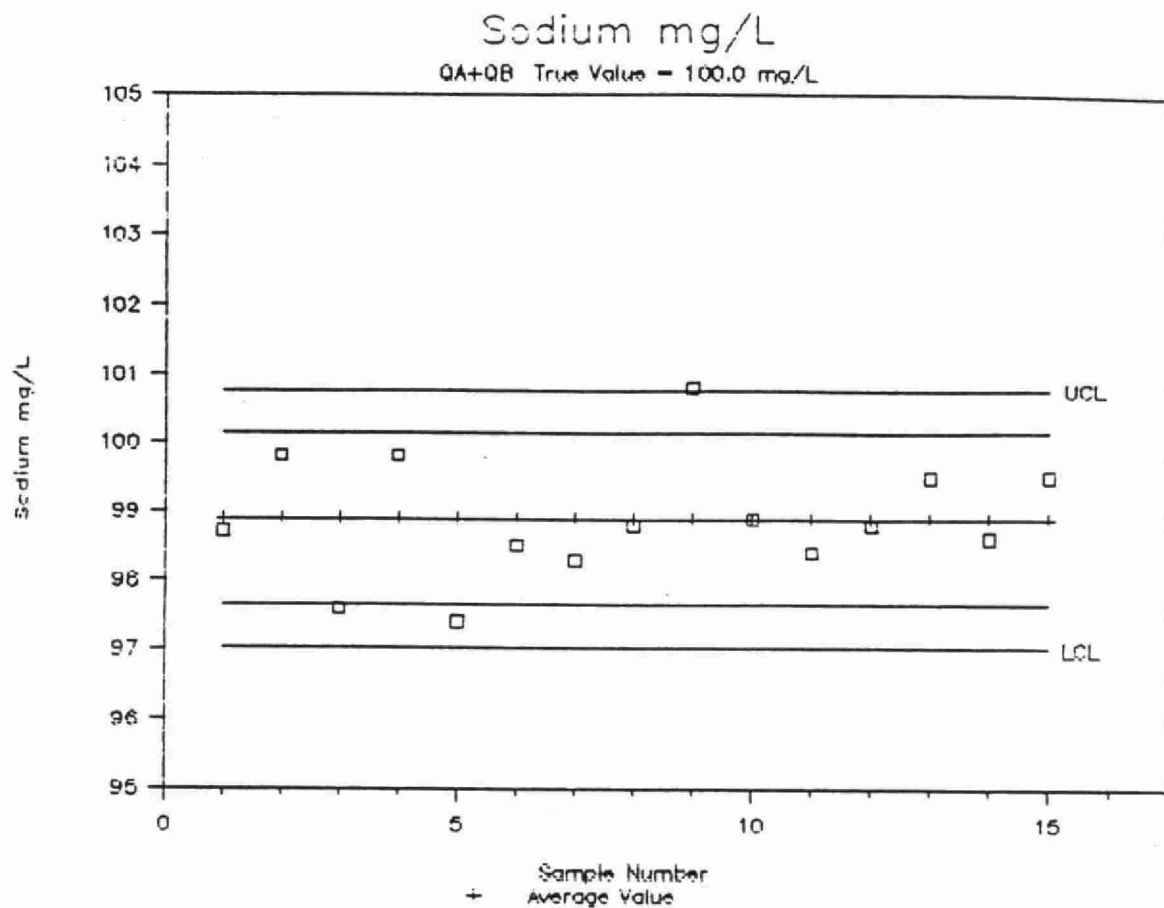


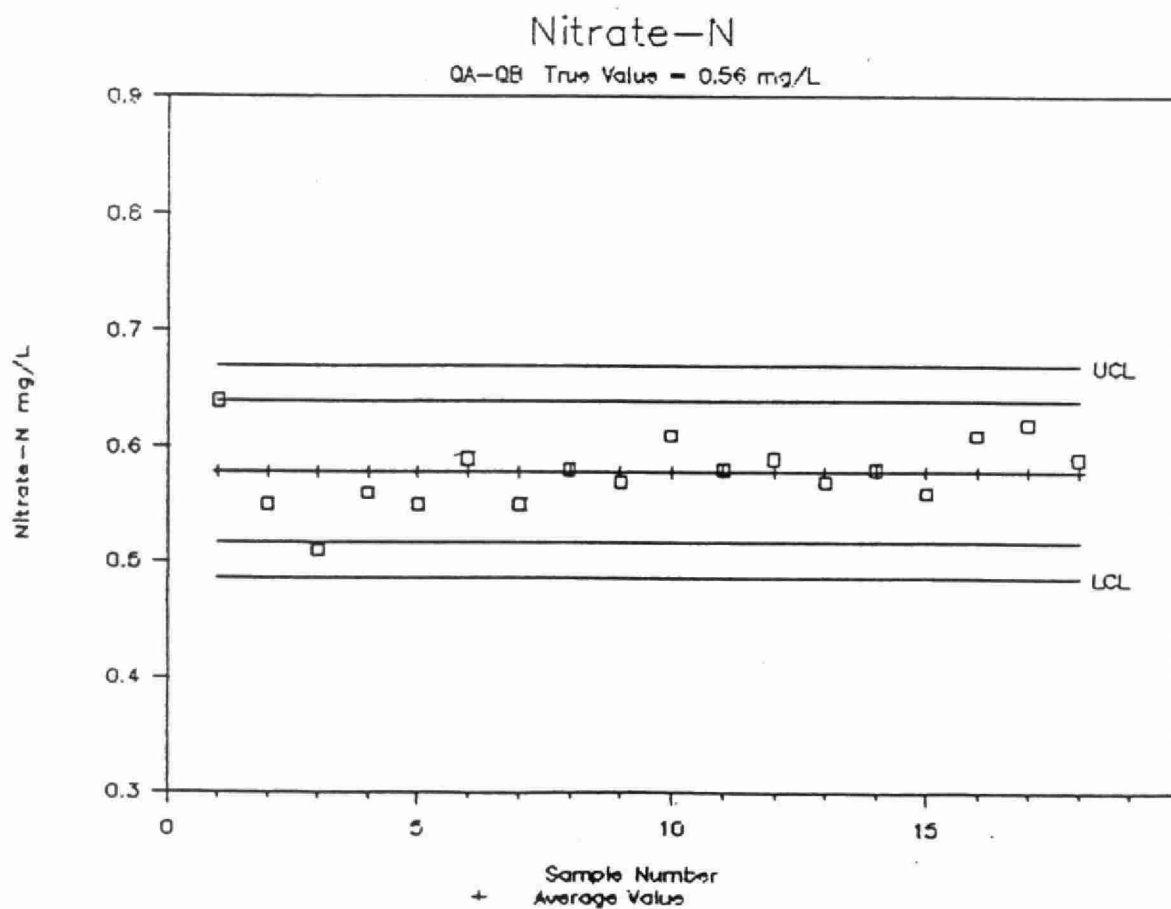
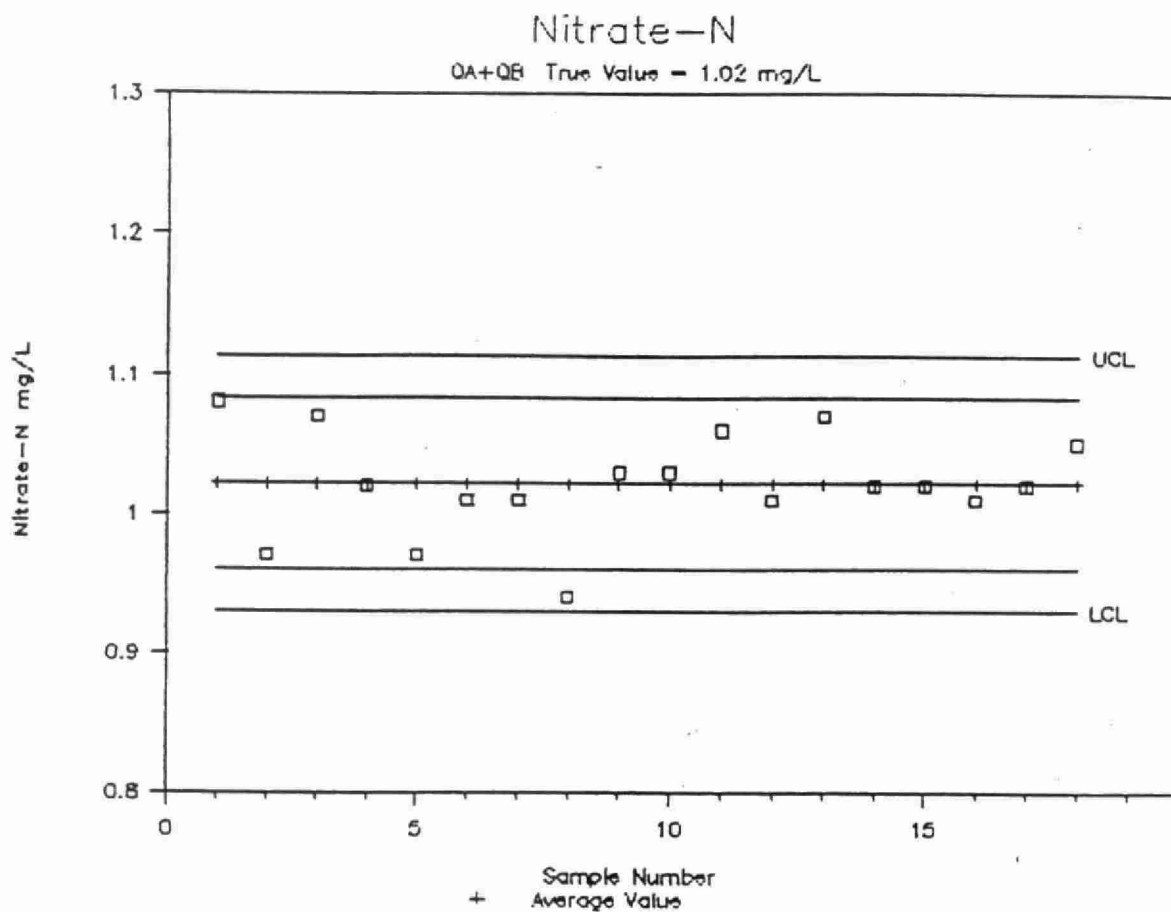






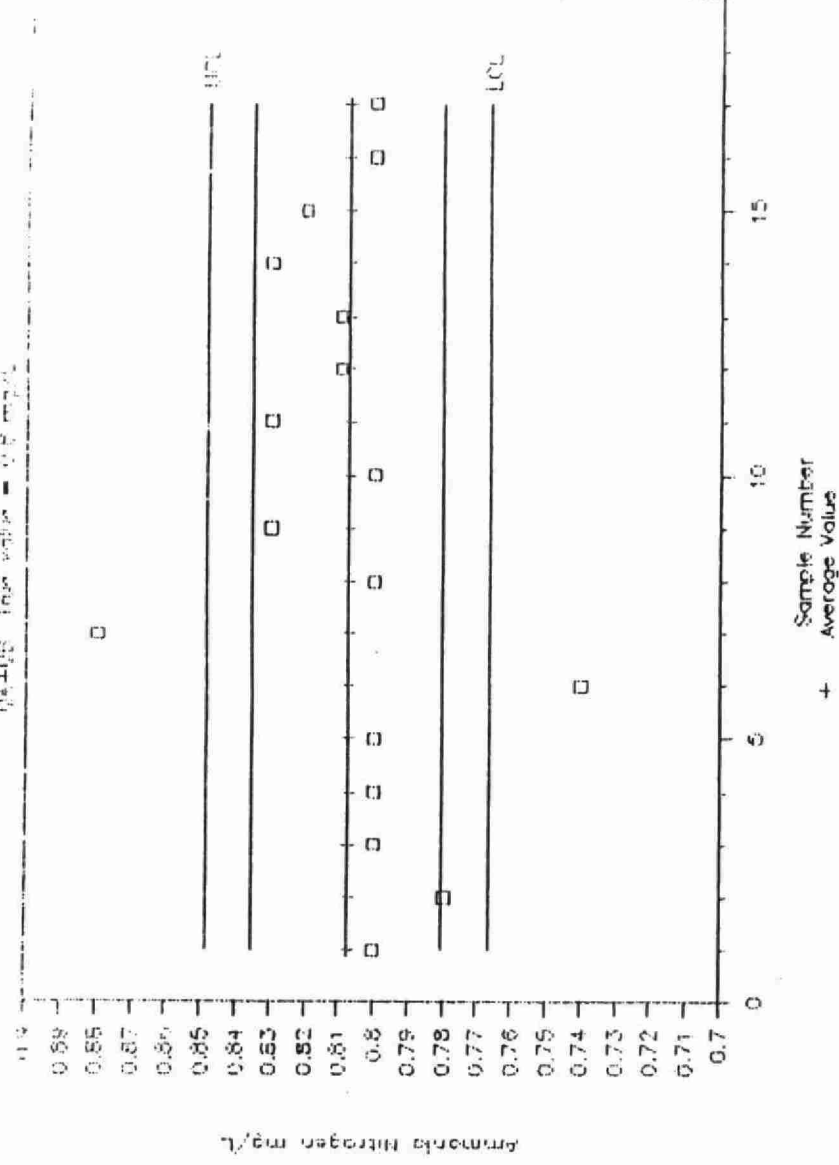






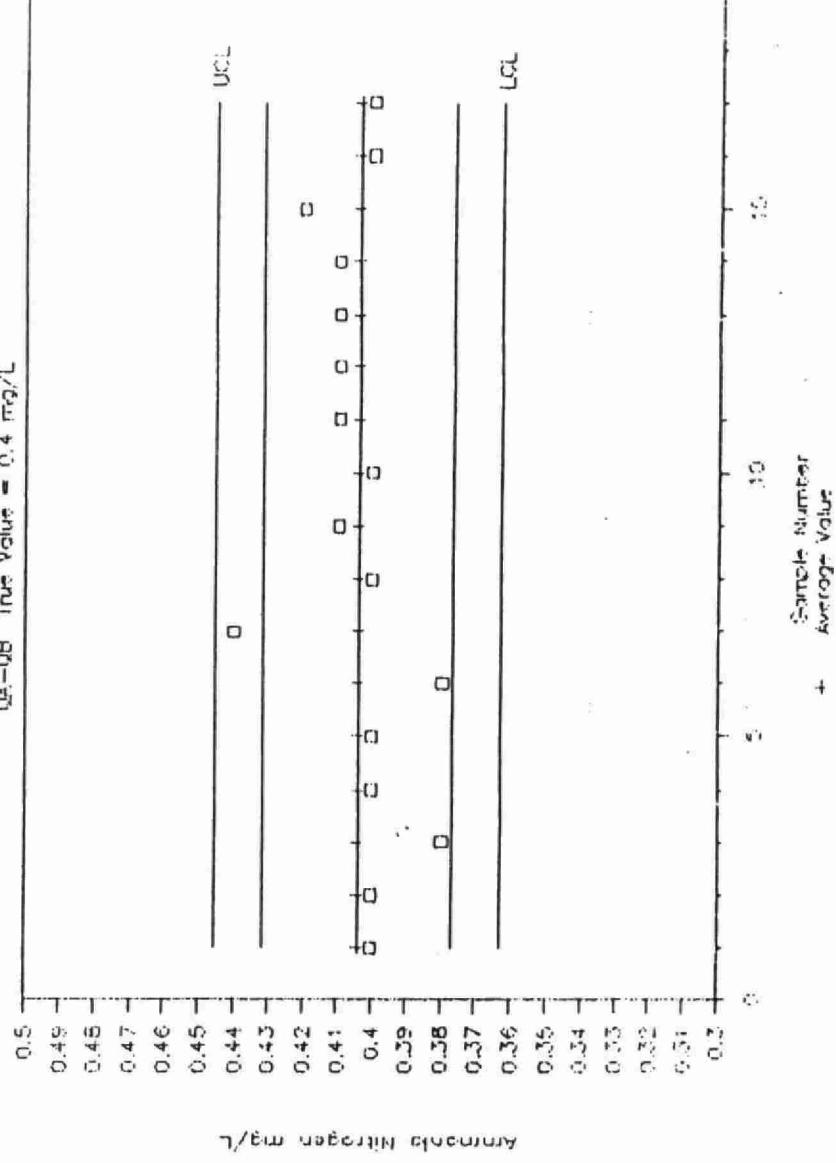
# Ammonia Nitrogen

Q1-Q3 True Value = 0.2 mg/L

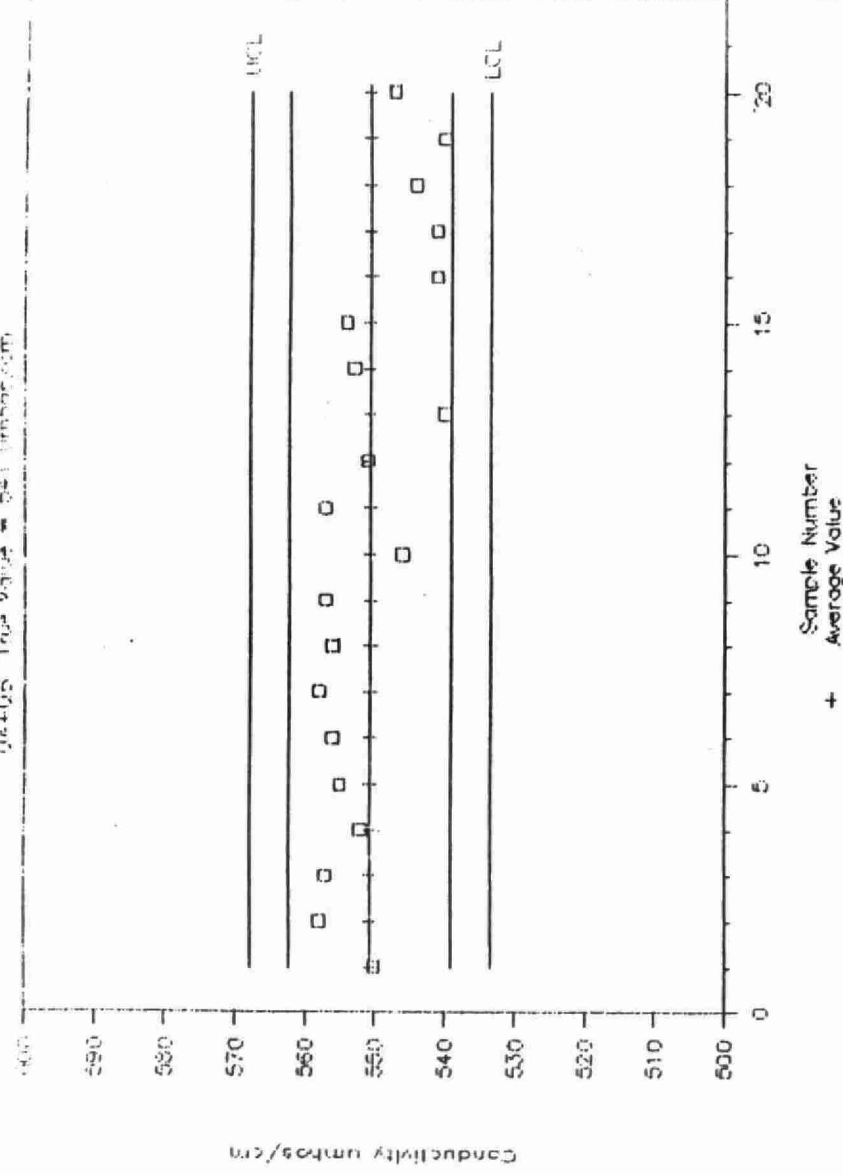


# Ammonia Nitrogen

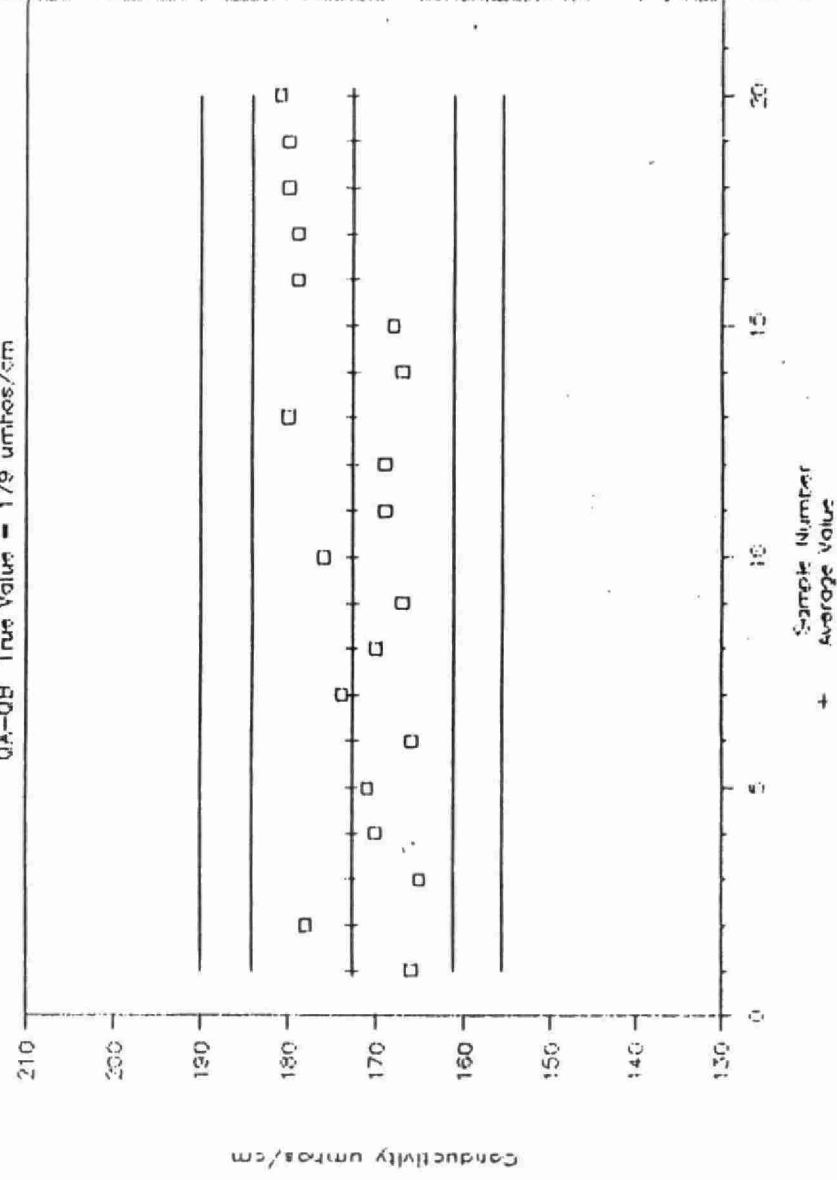
Q1-Q3 True Value = 0.4 mg/L



Conductivity  
04-08 True Value = 541 umhos/cm



Conductivity  
0A-08 True Value = 179 umhos/cm





REPLICATE DATA FOR CONTROL OF  
PRECISION DURING ANALYSIS OF  
ALGOMA-STELCO SAMPLES

Zinc (DCP) Water  
Working Range = 0.01 - 10 mg/L

| <0.05 mg/L |       |          |                | >0.05 - <1.0 mg/L |       |          |                | >1.0 mg/L  |       |          |                |
|------------|-------|----------|----------------|-------------------|-------|----------|----------------|------------|-------|----------|----------------|
| Replicates |       | R        | D <sup>2</sup> | Replicates        |       | R        | D <sup>2</sup> | Replicates |       | R        | D <sup>2</sup> |
| 0.04       | 0.037 | 0.003    | 0.000009       | 0.079             | 0.073 | 0.005    | 0.000036       | 7.52       | 7.21  | 0.31     | 0.0961         |
| 0.023      | 0.024 | 0.005    | 0.000025       | 0.223             | 0.225 | 0.002    | 0.000004       | 1.35       | 1.395 | 0.045    | 0.002025       |
| 0.04       | 0.043 | 0.003    | 0.000009       | 0.48              | 0.5   | 0.02     | 0.0004         | 3.2        | 3.1   | 0.1      | 0.01           |
| 0.012      | 0.013 | 0.001    | 0.000001       | 0.505             | 0.515 | 0.01     | 0.0001         |            |       |          |                |
| 0.02       | 0.02  | 0        | 0              | 0.16              | 0.145 | 0.015    | 0.000225       |            |       |          |                |
| 0.013      | 0.011 | 0.002    | 0.000004       | 0.132             | 0.13  | 0.002    | 0.000004       |            |       |          |                |
| 0.028      | 0.034 | 0.006    | 0.000036       | 0.05              | 0.054 | 0.004    | 0.000016       |            |       |          |                |
| 0.035      | 0.03  | 0.005    | 0.000025       | 0.072             | 0.07  | 0.002    | 0.000004       |            |       |          |                |
|            |       |          |                | 0.64              | 0.79  | 0.05     | 0.0025         |            |       |          |                |
| Sum        |       | 0.025    | 0.000109       | Sum               |       | 0.111    | 0.003289       | Sum        |       | 0.455    | 0.108125       |
| Mean R     |       | 0.003125 |                | Mean R            |       | 0.012333 |                | Mean R     |       | 0.151666 |                |
| S          |       | 0.002610 |                | S                 |       | 0.013517 |                | S          |       | 0.134241 |                |
| CL         |       | 0.010209 |                | CL                |       | 0.040293 |                | CL         |       | 0.495495 |                |
| SW         |       | 0.001845 |                | SW                |       | 0.009556 |                | SW         |       | 0.094923 |                |
| Precision  |       | 9.872630 |                | Precision         |       | 6.336935 |                | Precision  |       | 3.387603 |                |

Manganese (DCPI) Water  
Working Range = 0.01 - 5 mg/L

Working Range = 0.01 - 5 mg/L

| DATE   | REPLICATES |       |            |       |        |          | REPLICATES |       |                |          |            |      | REPLICATES |          |  |  |  |  |
|--------|------------|-------|------------|-------|--------|----------|------------|-------|----------------|----------|------------|------|------------|----------|--|--|--|--|
|        | 2.4        |       | 2.3        |       |        |          | 0.1 mg/L   |       | 0.1 - 1.0 mg/L |          |            |      | >1.0 mg/L  |          |  |  |  |  |
|        |            |       |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
|        |            |       | Replicates |       | R      | D²       | Replicates |       | R              | D²       | Replicates |      | R          | D²       |  |  |  |  |
| 871022 | 0.03       | 0.03  | 0.03       | 0.03  | 0      | 0        | 0.45       | 0.46  | 0              | 0        | 2.4        | 2.3  | 0.1        | 0.01     |  |  |  |  |
| 871027 | 0.02       | 0.02  | 0.03       | 0.03  | 0      | 0        | 0.33       | 0.34  | 0.01           | 0.0001   | 2.68       | 2.56 | 0.12       | 0.0144   |  |  |  |  |
| 871209 | 0.04       | 0.05  | 0.01       | 0.01  | 0      | 0        | 0.2        | 0.19  | 0.01           | 0.0001   | 1.32       | 1.33 | 0.01       | 0.0001   |  |  |  |  |
| 871222 | 0.01       | 0.01  | 0.02       | 0.02  | 0      | 0        | 0.462      | 0.46  | 0.002          | 0.000004 | 2.73       | 2.76 | 0.03       | 0.0009   |  |  |  |  |
| 871222 | 0.45       | 0.46  | 0.04       | 0.05  | 0.01   | 0.0001   | 0.37       | 0.36  | 0.01           | 0.0001   | 2.14       | 2.05 | 0.03       | 0.0009   |  |  |  |  |
| 871222 | 0.02       | 0.02  | 0.03       | 0.04  | 0.01   | 0.0001   | 0.197      | 0.198 | 0.001          | 0.000001 | 2.63       | 2.74 | 0.11       | 0.0121   |  |  |  |  |
| 880105 | 0.04       | 0.05  | 0.02       | 0.03  | 0.01   | 0.0001   | 0.11       | 0.109 | 0.001          | 0.000001 | 3.7        | 3.73 | 0.03       | 0.0009   |  |  |  |  |
| 880105 | 0.03       | 0.04  | 0.04       | 0.05  | 0.008  | 0.000064 | 0.947      | 0.946 | 0.001          | 0.000001 | 2.9        | 2.97 | 0.07       | 0.0049   |  |  |  |  |
| 880105 | 0.02       | 0.03  | 0.054      | 0.053 | 0.001  | 0.000001 | 0.84       | 0.79  | 0.05           | 0.0025   | 2.44       | 2.46 | 0.02       | 0.0004   |  |  |  |  |
| 880107 | 0.33       | 0.34  | 0.024      | 0.026 | 0.002  | 0.000004 | 0.499      | 0.496 | 0.003          | 0.000009 | 1.14       | 1.15 | 0.01       | 0.0001   |  |  |  |  |
| 880107 | 2.58       | 2.56  |            |       |        |          | 0.51       | 0.575 | 0.065          | 0.004225 |            |      |            |          |  |  |  |  |
| 880107 | 0.2        | 0.19  |            |       |        |          | 0.63       | 0.61  | 0.02           | 0.0004   |            |      |            |          |  |  |  |  |
| 880107 | 1.32       | 1.33  |            |       |        |          | 0.592      | 0.585 | 0.007          | 0.000049 |            |      |            |          |  |  |  |  |
| 880609 | 2.73       | 2.75  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 0.462      | 0.46  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 0.028      | 0.02  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 0.054      | 0.053 |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 2.14       | 2.05  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 10.4       | 10.6  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 0.37       | 0.36  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 2.53       | 2.74  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880617 | 0.197      | 0.198 | Sum        |       | 0.041  | 0.000369 | Sum        |       | 0.18           | 0.00749  | Sum        |      | 0.59       | 0.0519   |  |  |  |  |
| 880802 | 4.97       | 6.9   |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880802 | 0.11       | 0.109 | Mean R     |       | 0.0041 |          | Mean R     |       | 0.013846       |          | Mean R     |      | 0.059      |          |  |  |  |  |
| 880812 | 0.947      | 0.946 |            |       | S      | 0.004295 |            |       | S              | 0.016972 |            |      | S          | 0.050941 |  |  |  |  |
| 880812 | 0.024      | 0.025 |            |       | CL     | 0.013394 |            |       | CL             | 0.045235 |            |      | CL         | 0.192753 |  |  |  |  |
| 880812 | 0.499      | 0.496 |            |       | SW     | 0.003037 |            |       | SW             | 0.012001 |            |      | SW         | 0.036020 |  |  |  |  |
| 880823 | 0.51       | 0.575 |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880826 | 3.7        | 3.73  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880826 | 0.63       | 0.61  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880831 | 2.9        | 2.97  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880831 | 5.7        | 5.93  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880902 | 2.44       | 2.46  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880916 | 1.14       | 1.15  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880916 | 0.592      | 0.585 |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880920 | 7.2        | 6.61  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |
| 880920 | 7.2        | 6.92  |            |       |        |          |            |       |                |          |            |      |            |          |  |  |  |  |

Chromium (DCP) Water  
Working Range = 0.01 - 5 mg/L

| <0.05              |       |       |                | 0.05 - 1.0 mg/L    |       |       |                | >1.0 mg/L  |  |   |                |
|--------------------|-------|-------|----------------|--------------------|-------|-------|----------------|------------|--|---|----------------|
| Replicates         |       | R     | D <sup>2</sup> | Replicates         |       | R     | D <sup>2</sup> | Replicates |  | R | D <sup>2</sup> |
| 0.03               | 0.04  | 0.01  | 0.0001         | 0.06               | 0.06  | 0     | 0              |            |  |   |                |
| 0.03               | 0.04  | 0.01  | 0.0001         | 0.06               | 0.06  | 0     | 0              |            |  |   |                |
| 0.02               | 0.02  | 0     | 0              | 0.05               | 0.06  | 0.01  | 0.0001         |            |  |   |                |
| 0.02               | 0.03  | 0.01  | 0.0001         | 0.07               | 0.075 | 0.005 | 0.000025       |            |  |   |                |
| 0.02               | 0.05  | 0.03  | 0.0009         | 0.07               | 0.05  | 0.02  | 0.0004         |            |  |   |                |
| 0.05               | 0.03  | 0.02  | 0.0004         | 0.685              | 0.64  | 0.045 | 0.002025       |            |  |   |                |
| 0.008              | 0.01  | 0.002 | 0.000004       | 0.15               | 0.165 | 0.015 | 0.000225       |            |  |   |                |
| 0.013              | 0.016 | 0.003 | 0.000009       | 0.06               | 0.055 | 0.005 | 0.000025       |            |  |   |                |
| 0.02               | 0.026 | 0.006 | 0.000036       | 0.118              | 0.115 | 0.003 | 0.000009       |            |  |   |                |
| 0.016              | 0.014 | 0.002 | 0.000004       | 0.1                | 0.14  | 0.04  | 0.0016         |            |  |   |                |
| 0.01               | 0.012 | 0.002 | 0.000004       | 0.871              | 0.908 | 0.037 | 0.001369       |            |  |   |                |
| 0.011              | 0.012 | 0.001 | 0.000001       | 0.478              | 0.484 | 0.006 | 0.000036       |            |  |   |                |
| 0.01               | 0.013 | 0.003 | 0.000009       | 0.147              | 0.156 | 0.009 | 0.000081       |            |  |   |                |
| 0.035              | 0.03  | 0.005 | 0.000025       |                    |       |       |                |            |  |   |                |
| 0.049              | 0.047 | 0.002 | 0.000004       |                    |       |       |                |            |  |   |                |
| 0.046              | 0.048 | 0.002 | 0.000004       |                    |       |       |                |            |  |   |                |
| 0.028              | 0.027 | 0.001 | 0.000001       |                    |       |       |                |            |  |   |                |
| 0.01               | 0.015 | 0.005 | 0.000025       |                    |       |       |                |            |  |   |                |
| SUM 0.114 0.001726 |       |       |                | SUM 0.195 0.005895 |       |       |                |            |  |   |                |
| Mean R 0.00675     |       |       |                | Mean R 0.015       |       |       |                |            |  |   |                |
| S 0.007288         |       |       |                | S 0.015057         |       |       |                |            |  |   |                |
| CL 0.022052        |       |       |                | CL 0.049005        |       |       |                |            |  |   |                |
| SW 0.005133        |       |       |                | SW 0.010647        |       |       |                |            |  |   |                |
| Precision 28.95158 |       |       |                | Precision 6.650197 |       |       |                |            |  |   |                |

Nickel (DCP) Water  
Working Range = 0.01 - 5 mg/L

| <0.05      |          |                | 0.05 - 1.0 mg/L |          |                | >1.0 mg/L  |          |                |
|------------|----------|----------------|-----------------|----------|----------------|------------|----------|----------------|
| Replicates | R        | D <sup>2</sup> | Replicates      | R        | D <sup>2</sup> | Replicates | R        | D <sup>2</sup> |
| 0.03       | 0.025    | 0.005 0.000025 | 0.055           | 0.035    | 0.02 0.0004    | 2.86       | 2.92     | 0.06 0.0036    |
| 0.013      | 0.01     | 0.003 0.000009 | 0.108           | 0.12     | 0.012 0.000144 |            |          |                |
| 0.006      | 0.007    | 0.001 0.000001 | 0.102           | 0.104    | 0.002 0.000004 |            |          |                |
| 0.007      | 0.008    | 0.001 0.000001 | 0.068           | 0.08     | 0.012 0.000144 |            |          |                |
| 0.032      | 0.035    | 0.003 0.000009 | 0.212           | 0.15     | 0.052 0.003844 |            |          |                |
| 0.03       | 0.025    | 0.005 0.000025 | 0.385           | 0.41     | 0.025 0.000625 |            |          |                |
| 0.04       | 0.044    | 0.004 0.000016 | 0.494           | 0.496    | 0.002 0.000004 |            |          |                |
| 0.015      | 0.012    | 0.003 0.000009 | 0.062           | 0.068    | 0.006 0.000036 |            |          |                |
|            |          |                | 0.158           | 0.156    | 0.002 0.000004 |            |          |                |
| SUM        | 0.025    | 0.000095       | SUM             | 0.143    | 0.005205       |            |          |                |
| Mean R     | 0.003125 |                | Mean R          | 0.015888 |                | SUM        | 0.06     | 0.0036         |
| S          | 0.002436 |                | S               | 0.017004 |                | Mean R     | 0.06     |                |
| CL         | 0.010209 |                | CL              | 0.051909 |                | S          | 0.042426 |                |
| SW         | 0.001723 |                | SW              | 0.012024 |                | CL         | 0.19502  |                |
| Precision  | 11.50064 |                | Precision       | 9.102657 |                | SW         | 0.03     |                |

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50 - 100 mg/L

| Replicates |      | R   | D <sup>2</sup> |
|------------|------|-----|----------------|
| 68         | 68   | 0   | 0              |
| 62         | 59   | 3   | 9              |
| 51         | 53   | 2   | 4              |
| 51         | 51   | 0   | 0              |
| 55         | 55.6 | 0.6 | 0.36           |
| 63         | 63   | 0   | 0              |
| 97         | 95.5 | 0.5 | 0.25           |
| 92.8       | 93   | 0.2 | 0.04           |
| 80         | 78   | 2   | 4              |
| 84.6       | 87.2 | 2.6 | 6.76           |

SW 0.781184

```
Mean R      1.25
S 1.369306
CL 4.08375
SW 0.968245
```

Aluminum (DCP)  
Working Range = 0.05 - 20 mg/L

0.05 - 1.0 mg/L

1.0 - 5.0 mg/L

5.0 - 20 mg/L

| Replicates |       | R     | D <sup>2</sup> |
|------------|-------|-------|----------------|
| 0.28       | 0.42  | 0.14  | 0.0196         |
| 0.2        | 0.38  | 0.18  | 0.0324         |
| 0.65       | 0.7   | 0.05  | 0.0025         |
| 0.26       | 0.26  | 0     | 0              |
| 0.52       | 0.85  | 0.33  | 0.1089         |
| 0.48       | 0.5   | 0.02  | 0.0004         |
| 0.56       | 1.5   | 0.94  | 0.8836         |
| 0.76       | 0.85  | 0.09  | 0.0081         |
| 0.36       | 0.36  | 0     | 0              |
| 0.62       | 0.62  | 0     | 0              |
| 0.16       | 0.14  | 0.02  | 0.0004         |
| 0.48       | 0.48  | 0     | 0              |
| 0.4        | 0.45  | 0.05  | 0.0025         |
| 0.2        | 0.18  | 0.02  | 0.0004         |
| 0.26       | 0.26  | 0     | 0              |
| 0.44       | 0.5   | 0.06  | 0.0036         |
| 0.06       | 0.06  | 0     | 0              |
| 0.08       | 0.08  | 0     | 0              |
| 0.06       | 0.06  | 0     | 0              |
| 0.58       | 0.57  | 0.01  | 0.0001         |
| 0.34       | 0.32  | 0.02  | 0.0004         |
| 1          | 0.98  | 0.02  | 0.0004         |
| 0.65       | 0.64  | 0.01  | 0.0001         |
| 0.86       | 0.4   | 0.46  | 0.2116         |
| 0.16       | 0.14  | 0.02  | 0.0004         |
| 0.08       | 0.09  | 0     | 0              |
| 0.26       | 0.24  | 0.02  | 0.0004         |
| 0.34       | 0.28  | 0.06  | 0.0036         |
| 0.56       | 0.65  | 0.09  | 0.0081         |
| 0.14       | 0.14  | 0     | 0              |
| 0.256      | 0.222 | 0.036 | 0.001296       |
| 0.037      | 0.036 | 0.001 | 0.000001       |

Sum 2.647 1.236797

```
Mean R 0.082718
      S 0.141906
      CL 0.270242
      SW 0.100343
```

```
Precision 35.69553
```

| Replicates |      | R    | D <sup>2</sup> |
|------------|------|------|----------------|
| 1.22       | 1.42 | 0.2  | 0.04           |
| 1.52       | 1.58 | 0.06 | 0.0036         |
| 1.84       | 1.7  | 0.14 | 0.0196         |
| 1.16       | 1.05 | 0.11 | 0.0121         |
| 2          | 2.2  | 0.2  | 0.04           |
| 2.9        | 2.9  | 0    | 0              |
| 1.42       | 1.58 | 0.16 | 0.0256         |
| 1.22       | 1.26 | 0.06 | 0.0036         |
| 2.7        | 3.3  | 0.6  | 0.36           |
| 2.1        | 2.1  | 0    | 0              |
| 1.04       | 1.2  | 0.16 | 0.0256         |
| 2.5        | 2.66 | 0.08 | 0.0064         |
| 2.23       | 2.28 | 0.05 | 0.0025         |
| 1.82       | 1.94 | 0.12 | 0.0144         |
| Sum        |      | 1.94 | 0.5534         |

```
Mean R 0.138571
      S 0.140585
      CL 0.452712
      SW 0.099406
```

```
Precision 7.429962
```

| Replicates | R        | D <sup>2</sup> |
|------------|----------|----------------|
| 8.2        | 7.6      | 0.6            |
| 10.2       | 11.35    | 1.15           |
|            |          | 1.3225         |
| Sum        | 1.75     | 1.6825         |
| Mean R     | 0.875    |                |
| S          | 0.648556 |                |
| CL         | 2.858625 |                |
| SW         | 0.458596 |                |
| Precision  | 6.945714 |                |

**Magnesium**  
Working Range = 0.05 - 100 µg/L

0.05 - 20 mg/L

20 - 50%  
20 - 50 mg/L

50 - 100%  
50 - 100 mg/L

| Replicates |      | R    | D <sup>2</sup> | Replicates |          | R    | D <sup>2</sup> | Replicates |          | R    | D <sup>2</sup> |
|------------|------|------|----------------|------------|----------|------|----------------|------------|----------|------|----------------|
| 1.8        | 1.9  | 0.1  | 0.01           | 33         | 32       | 1    | 1              | 54         | 54       | 0    | 0              |
| 2.9        | 3    | 0.1  | 0.01           | 46         | 45       | 1    | 1              | 65.8       | 66.5     | 0.7  | 0.49           |
| 9.1        | 10   | 0.9  | 0.81           | 42.8       | 41.8     | 1    | 1              | 56.8       | 58       | 1.2  | 1.44           |
| 5.1        | 5.2  | 0.1  | 0.01           | 42.3       | 43.1     | 0.8  | 0.64           | 56.2       | 55.4     | 0.8  | 0.64           |
| 6.6        | 6.7  | 0.1  | 0.01           | 44.1       | 44.2     | 0.1  | 0.01           |            |          |      |                |
| 8.3        | 8.5  | 0.2  | 0.04           | 46.3       | 46       | 0.3  | 0.09           |            |          |      |                |
| 3.1        | 3.1  | 0    | 0              | 31         | 31.2     | 0.2  | 0.04           |            |          |      |                |
| 5.6        | 5.6  | 0    | 0              |            |          |      |                |            |          |      |                |
| 9.1        | 8.5  | 0.6  | 0.36           |            |          |      |                |            |          |      |                |
| 8.4        | 9.6  | 1.2  | 1.44           | Sum        | 4.4      | 3.76 |                | Sum        | 2.7      | 2.57 |                |
| 2.9        | 3    | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 4.9        | 5.4  | 0.5  | 0.25           | Mean R     | 0.628571 |      |                | Mean R     | 0.675    |      |                |
| 7.8        | 7.9  | 0.1  | 0.01           | S          | 0.519615 |      |                | S          | 0.566789 |      |                |
| 3.2        | 3.2  | 0    | 0              | CL         | 2.053542 |      |                | CL         | 2.205225 |      |                |
| 3.1        | 3.1  | 0    | 0              | SW         | 0.367423 |      |                | SW         | 0.400780 |      |                |
| 5.2        | 5    | 0.2  | 0.04           |            |          |      |                |            |          |      |                |
| 4.4        | 4.2  | 0.2  | 0.04           |            |          |      |                |            |          |      |                |
| 4.7        | 4.6  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 4.7        | 4.7  | 0    | 0              |            |          |      |                |            |          |      |                |
| 3.7        | 4.3  | 0.6  | 0.36           |            |          |      |                |            |          |      |                |
| 4.6        | 4.6  | 0    | 0              |            |          |      |                |            |          |      |                |
| 13.9       | 14.3 | 0.4  | 0.16           |            |          |      |                |            |          |      |                |
| 2.8        | 2.9  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 4.3        | 4.2  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 2.2        | 2.2  | 0    | 0              |            |          |      |                |            |          |      |                |
| 8.7        | 8.6  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 8.9        | 8.7  | 0.2  | 0.04           |            |          |      |                |            |          |      |                |
| 7.4        | 7.2  | 0.2  | 0.04           |            |          |      |                |            |          |      |                |
| 8.4        | 8.4  | 0    | 0              |            |          |      |                |            |          |      |                |
| 8.2        | 8.3  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 5.9        | 6.4  | 0.5  | 0.25           |            |          |      |                |            |          |      |                |
| 5          | 5.1  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 5.1        | 5.2  | 0.1  | 0.01           |            |          |      |                |            |          |      |                |
| 1.22       | 1.16 | 0.06 | 0.0036         |            |          |      |                |            |          |      |                |
| 9.5        | 9.29 | 0.21 | 0.0441         |            |          |      |                |            |          |      |                |
| 6          | 5.3  | 0.7  | 0.49           |            |          |      |                |            |          |      |                |
| 13.2       | 12.7 | 0.5  | 0.25           |            |          |      |                |            |          |      |                |

|     |      |        |
|-----|------|--------|
| Sum | 8.47 | 4.7477 |
|-----|------|--------|

```

Mean R 0.228918
      S 0.253294
CL 0.747878
SW 0.179106

```



Potassium (DCP)  
Working Range = 0.05 - 25 mg/L

1.0 - 5.0 mg/L

5.0 - 12.5 mg/L

12.5 - 25 mg/L

| Replicates |      | R    | D <sup>2</sup> |
|------------|------|------|----------------|
| 2.4        | 2.5  | 0.1  | 0.01           |
| 1.4        | 1.8  | 0.4  | 0.16           |
| 1.7        | 2.2  | 0.5  | 0.25           |
| 1.7        | 1.75 | 0.05 | 0.0025         |
| 1.75       | 2.3  | 0.55 | 0.3025         |
| 1.7        | 1.8  | 0.1  | 0.01           |
| 4.5        | 4.4  | 0.1  | 0.01           |
| 1.15       | 1.15 | 0    | 0              |
| 1.15       | 1.1  | 0.05 | 0.0025         |
| 1.9        | 1.75 | 0.15 | 0.0225         |
| 1.04       | 1.02 | 0.02 | 0.0004         |
| 4.4        | 4.6  | 0.2  | 0.04           |
| 4.9        | 4.8  | 0.1  | 0.01           |
| 1.05       | 1    | 0.05 | 0.0025         |
| 1.7        | 1.7  | 0    | 0              |
| 2          | 2.3  | 0.3  | 0.09           |
| 1.5        | 1.6  | 0.1  | 0.01           |
| 1.65       | 1.65 | 0    | 0              |
| 3.86       | 4.04 | 0.18 | 0.0324         |
| 3.07       | 3.24 | 0.17 | 0.0289         |
| 2.78       | 2.69 | 0.09 | 0.0081         |
| 3.56       | 3.76 | 0.2  | 0.04           |
| 4.53       | 4.6  | 0.07 | 0.0049         |
| 3.4        | 3.33 | 0.07 | 0.0049         |
| 1.68       | 1.72 | 0.04 | 0.0016         |
| 1.05       | 0.95 | 0.1  | 0.01           |
| 2.88       | 2.83 | 0.05 | 0.0025         |
| 2.78       | 2.7  | 0.08 | 0.0064         |

|     |      |        |
|-----|------|--------|
| Sum | 3.82 | 1.0626 |
|-----|------|--------|

```
Mean R 0.136428
      S 0.137749
      CL 0.445712
      SW 0.097403
```

| Replicates |      | R    | D <sup>2</sup> |
|------------|------|------|----------------|
| 5.5        | 6.4  | 0.9  | 0.81           |
| 6.2        | 8    | 1.8  | 3.24           |
| 7.4        | 7.3  | 0.1  | 0.01           |
| 8.5        | 8.8  | 0.3  | 0.09           |
| 7.7        | 7.85 | 0.15 | 0.0225         |
| 7.6        | 7.9  | 0.3  | 0.09           |
| 6.9        | 6.4  | 0.5  | 0.25           |
| 6.8        | 6.7  | 0.1  | 0.01           |
| 8          | 8    | 0    | 0              |
| 5.1        | 5.1  | 0    | 0              |
| 6.2        | 6.3  | 0.1  | 0.01           |
| 11.8       | 11.7 | 0.1  | 0.01           |
| 8.39       | 8.6  | 0.21 | 0.0441         |
| 5.04       | 4.98 | 0.06 | 0.0036         |
| 7.64       | 7.44 | 0.2  | 0.04           |

|     |      |        |
|-----|------|--------|
| Sum | 4.82 | 4.6302 |
|-----|------|--------|

```
Mean R 0.321333
      S 0.392861
      CL 1.049796
      SW 0.277794
```

| Replicates |      | R   | D <sup>2</sup> |
|------------|------|-----|----------------|
| 12.3       | 13.2 | 0.9 | 0.81           |
| 12.4       | 12.6 | 0.2 | 0.04           |
| 16         | 16.2 | 0.2 | 0.04           |
| 17.4       | 19.4 | 2   | 4              |
| 22.8       | 22.5 | 0.3 | 0.09           |
| 13.1       | 12.7 | 0.4 | 0.16           |

|     |   |      |
|-----|---|------|
| Sum | 4 | 5.14 |
|-----|---|------|

```
Mean R 0.666666
S 0.654471
CL 2.178
SW 0.462781
```

Sodium (DCP)  
Working Range = 0.5 - 100 mg/L

| 0.5 - 20 mg/L |      |      |                | 20 - 50 mg/L |          |   |                | 50 - 100%<br>50 - 100 mg/L |          |    |                |
|---------------|------|------|----------------|--------------|----------|---|----------------|----------------------------|----------|----|----------------|
| Replicates    |      | R    | D <sup>2</sup> | Replicates   |          | R | D <sup>2</sup> | Replicates                 |          | R  | D <sup>2</sup> |
| 2.3           | 2    | 0.3  | 0.09           | 24           | 23       | 1 | 1              | 82                         | 85       | 3  | 9              |
| 3.5           | 4    | 0.5  | 0.25           | 21           | 20       | 1 | 1              | 55                         | 57       | 2  | 4              |
| 6.5           | 7.5  | 1    | 1              | 40.4         | 40.7     |   |                | 62                         | 60       | 2  | 4              |
| 5.5           | 5.5  | 0    | 0              | 36.8         | 38.3     |   |                | 73                         | 70       | 3  | 9              |
| 2.5           | 4    | 1.5  | 2.25           | 35           | 34.5     |   |                | 73                         | 71       | 2  | 4              |
| 8.5           | 9    | 0.5  | 0.25           | 21.3         | 22.8     |   |                |                            |          |    |                |
| 9.5           | 9    | 0.5  | 0.25           | 26.1         | 26       |   |                | Sum                        | 12       | 30 |                |
| 10            | 10   | 0    | 0              | 30.6         | 29.4     |   |                | Mean R                     | 2.4      |    |                |
| 13            | 13   | 0    | 0              | 37           | 37.1     |   |                | S                          | 1.732050 |    |                |
| 7             | 6.5  | 0.5  | 0.25           | 20.8         | 20.6     |   |                | CL                         | 7.8408   |    |                |
| 3.5           | 3.5  | 0    | 0              |              |          |   |                | SW                         | 1.224744 |    |                |
| 2.5           | 2.58 | 0.08 | 0.0064         |              |          |   |                |                            |          |    |                |
| 2             | 1.5  | 0.5  | 0.25           | Sum          | 2        | 2 |                |                            |          |    |                |
| 3.5           | 3.5  | 0    | 0              | Mean R       | 1        |   |                |                            |          |    |                |
| 20            | 19   | 1    | 1              | S            | 0.707106 |   |                |                            |          |    |                |
| 9             | 8.5  | 0.5  | 0.25           | CL           | 3.267    |   |                |                            |          |    |                |
| 12.5          | 13.5 | 1    | 1              | SW           | 0.5      |   |                |                            |          |    |                |
| 14            | 14   | 0    | 0              |              |          |   |                |                            |          |    |                |
| 9.94          | 10   | 0.06 | 0.0036         |              |          |   |                |                            |          |    |                |
| 9.5           | 9.38 | 0.12 | 0.0144         |              |          |   |                |                            |          |    |                |

Sum 8.06 6.8644

Mean R 0.403  
S 0.414258  
CL 1.316601  
SW 0.292924

**APPENDIX 7**

**Subcontractors' Reports**

**HYDROGEOLOGY**

**BY**

**TERRAQUA INVESTIGATIONS LTD.**

**JANUARY 1989**



TERRAQUA INVESTIGATIONS LTD.

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HYDROGEOLOGICAL INVESTIGATION  
ALGOMA STEEL CORPORATION  
SLAG DISPOSAL SITE

for

Ontario Ministry of the Environment

by

TERRAQUA INVESTIGATIONS LTD.

R. Blackport

B. Boyle

Reference No. TA8873

September 1990

## 1.0 INTRODUCTION

The following hydrogeologic study, performed by Terraqua Investigations Ltd., focuses on the groundwater flow conditions at the Algoma Steel Slag site. The scope of work included the installation, development and water level monitoring of 34 piezometers on or adjacent to the slag dump area, the completion of response tests at each of the piezometers, and the estimation of groundwater velocity and flux in several areas of the site.

The following sections describe the study methods and the general geology and hydrostratigraphy of the Algoma Steel slag site. General results from previous hydrogeologic studies (Geocon, 1983; CRA, 1988; GLL, 1988) have been incorporated into the discussion of the results of this study.



## 2.0 METHODS

Details of the drilling, soil sampling and response test procedures are documented on Appendix 1; only a brief description is presented here.

### 2.1 DRILLING AND PIEZOMETER INSTALLATION

#### 2.1.1 Drilling Methods and Soil Sampling

Hollow stem augering, using a CME-75 drill rig equipped with standard 10.8 cm (4 1/4 inch) inner-diameter (I.D.) augers, was employed at all but two of the boreholes drilled on-site. The required depth of penetration and difficult drilling conditions necessitated the use of the wet rotary method at locations B2-3 and A7-1.

Subsurface samples were collected using either a continuous or split-spoon sampler; where wet rotary drilling was used, cuttings were obtained using a wire-mesh sieve.

All samples were photographed and geologically logged in the field. Representative sub-samples were collected in glass jars for visual reference.

#### 2.1.2 Piezometer Installation

A single piezometer was installed within each exploratory borehole. Nested piezometers were installed at several drilling locations, and are comprised of two or three piezometers



installed at varying depths in separate boreholes drilled within about 3 metres of one another.

All piezometers (with the exception of A7-1, which had a steel casing) were constructed from 5 cm (2-inch) I.D. schedule 40 polyvinyl chloride (PVC) casing and slotted pipe. The final configurations of the piezometers in each of the boreholes are presented in Appendix 2.

## 2.2 SINGLE WELL HYDRAULIC CONDUCTIVITY TESTING

Response tests were conducted at all piezometers, except A7-1, to determine the average *in situ* hydraulic conductivity of the geologic materials which are intersected by the filterpack surrounding the well screen. A7-1 was not tested as its large diameter made this impractical. The response test data were analyzed using the method of Hvorslev (1951). A description of this method is included in Appendix 1, and calculations are included in Appendix 3.





### 3.0 RESULTS

#### 3.1 HYDROSTRATIGRAPHY

The regional geology of the Algoma slag site and surrounding area is illustrated schematically in Figure 3.1 (based on Geocon, 1983). The Algoma Steel slag area is underlain by a sequence of glaciolacustrine, till and granular deposits of varying thickness. Bedrock is comprised of Cambrian sandstone having extremely irregular topography beneath the site. The sediments and sandstone pinch out against the Pre-Cambrian basement rock which outcrops in the highland area to the north of Sault Ste. Marie. Bedrock occurs at a shallow depth beneath the high slag area, but drops off quickly to the north and east, and more gradually to the southwest.

Schematic cross-sections illustrating the general geology of the Algoma slag site are presented in Figures 3.2 and 3.3. A full suite of detailed geologic sections are included in Appendix 8. The geologic material beneath the slag area can be divided into six distinct and significant hydrostratigraphic units, as follows:

- 1) slag material
- 2) shallow sand and gravel
- 3) laminated clay and silt
- 4) silty sand till
- 5) basal sand and gravel, and fractured/weathered sandstone



and 6) competent sandstone **bedrock**

A brief description of the units is given below; a more detailed description is included in Appendix 2.

**Bedrock** is comprised of a dense red and white feldspathic sandstone, which serves as a regional high capacity aquifer. The upper metre of the sandstone is brittle, highly fractured and permeable as a result of weathering during pre-glacial exposure. A bedrock structural high is located in the centre of the site, near piezometers C2 and C3 (Figure 3.4). This high appears to have controlled further deposition and shallow groundwater flow (as described in subsequent sections). Large sandstone boulders were encountered above the erosional surface of the Cambrian bedrock.

A clean, coarse **basal sand and gravel** overlies the weathered bedrock surface in the eastern area of the site (Figures 3.2 and 3.3). This sand and gravel is multi-coloured, semi-rounded, and is overlain by a fine- to coarse-grained brown sand and gravel. These basal granular units are up to 20 metres thick and appear to be quite permeable, so are quite likely to be hydraulically connected to the weathered sandstone.

To the west of the bedrock high, a dense, red, pebbly to stony **silty sand till** overlies the bedrock and thickens toward the southwest (Figures 3.2 and 3.3). A red silty sand unit flanks the eastern edge of the bedrock high, but it is less till-like (i.e., it may be a hydraulically re-worked till) than the unit to the



west. The silty sand thickens toward the bedrock valley, but is not present within the valley itself.

Glaciolacustrine **clay and silt** were encountered in all boreholes to the northeast of the line indicated on Figure 3.4, which corresponds closely to the perceived bedrock topographical high. This unit is 15 to 20 metres thick to the north of the site and pinches out beneath the slag dump. The unit is comprised of laminater, cohesive red clay and brown silt deposited during the late Algonquin and post-Algonquin. The top of the unit slopes gently to the northeast.

A brown **sand and gravel** unit up to 4 metres thick was found beneath the slag at many drilling locations, particularly those areas inland of the original shoreline, but away from the bedrock high near the centre of the slag dump area (Figure 3.4). This unit tends to be silty to the west of the bedrock high, and relatively clean to the east. The sand appears to be fluvial and may have been deposited by Spring, Bennett and West Davignon Creeks prior to construction of the diversion channels.

The uppermost unit is generally comprised of slag material which varies in grain size from very large boulders to very coarse sand. The finer component is generally located at the base of the slag deposit.

Figure 3.4 illustrates the ground surface topography prior to the disposal of the slag. A topographic high (which corresponds with the bedrock high) is located in the vicinity of piezometer C2.



## 3.2 GROUNDWATER FLOW SYSTEM CONDITIONS

### 3.2.1 Groundwater Flow Directions

Regional groundwater flow is from the north toward the St. Marys River in the south (Geocon, 1983). Groundwater is recharged via the exposed and fractured bedrock of the highlands and moves to discharge in the St. Marys River.

The configuration of the water table at the slag site, as presented in Figure 3.5, is generally controlled by the relief of the original ground surface (compare to Figure 3.4). The water table is 0.5 to 2 metres above the original ground surface inland of the former shoreline. Shallow groundwater flow occurs radially outwards from the original topographic high. On the eastern half of the site, the water table slopes gradually in a southeastern direction (Figure 3.5) toward St. Marys River, approximating the original ground surface contours to the original shoreline. At Baseline Road (i.e., boreholes A3 and A4), the water levels indicate that shallow groundwater flows in an easterly and slight northerly direction, as it appears to be controlled by the ditch along Baseline Road. Water levels monitored within the western half of the site show shallow groundwater flow to be towards Leigh Bay and the West Davignon Diversion Ditch (Figure 3.5). The schematic cross-sections also illustrate the directions of groundwater flow (Figures 3.2 and 3.3).



### 3.2.2 Recharge/Discharge Areas

Regional recharge to the bedrock and basal granular aquifers takes place mainly in the highland area to the north of the city, where Pre-Cambrian bedrock is exposed. The major zone of regional groundwater discharge is St. Mary's River.

Upward vertical hydraulic gradients, indicating predominantly discharge conditions across the study area, exist at all piezometer locations except A1 (Table 3.1). The upward hydraulic upgradients vary from about 0.009 to 0.12 metres/metre, with the lowest gradient occurring along the edge of the slag shoreline and the highest gradient at A2, just southwest of the limit of laminated clay and silt.

Piezometer A1 is situated between the oil pond and the pickling liquor disposal area, in a valley in the permeable slag material. Large volumes of water pickling liquor (38,000 litres/day) and oily water (280,000 litres/month) are disposed of here, thus this area constitutes a local groundwater recharge zone. Although precipitation infiltrates across most of the site, the high hydraulic conductivity of the slag results in the relatively rapid horizontal movement of groundwater, such that recharge conditions are not apparent over the other areas of the slag site.

Local discharge zones in the slag disposal area appear to include:



- 1) the Baseline ditch and Spring Creek, which receive shallow groundwater flow from the topographic high to the south and from the gently sloping slag/fill area to the north;
  - 2) the West Davignon Diversion Channel, which drains the eastern part of the slag/fill area north of Baseline Road;
  - 3) the Bennett Creek Diversion Channel, which receives recharge from the western face of the topographic high;
- and 4) the St. Marys River which drains the southern face of the topographic high and the area to the south of Spring Creek.

### 3.2.3 Estimated Groundwater Fluxes

The flux of groundwater leaving the Algoma site has been calculated by estimating the lateral groundwater flow beneath the site. Groundwater flow in the porous geologic materials may be estimated using the Darcy equation:

$$q = KIA$$

where  $q$  = groundwater flux per unit cross-sectional area ( $L^3/T$ )

$K$  = horizontal hydraulic conductivity ( $L/T$ )

$I$  = horizontal hydraulic gradient ( $L/L$ )

$A$  = cross-sectional area ( $L^2$ ).

Area is equivalent to the length of the perimeter of the slag site multiplied by the thickness of the geologic unit through



which flow occurs. Hydraulic conductivities and gradients were obtained from analysis of response tests and water level data, respectively.

A summary of average horizontal hydraulic conductivity values is presented in Table 3.2. Response tests could not be conducted successfully at piezometers which were screened within the coarse slag material (generally those located along the present shoreline) as the slag was sufficiently permeable to prevent a measurable water level decline. However, the hydraulic conductivity of this material is expected to be on the order of at least  $5 \times 10^{-4}$  m/s, which is consistent with values given for clean sand by Freeze and Cherry (1979). The hydraulic conductivity of the slag unit is one to four orders of magnitude higher than the values calculated for the till, clay, and silty sand and gravel.

Flux through the slag would be one to four orders of magnitude greater than the flux through the less permeable underlying material, under similar lateral hydraulic gradients and assuming similar thicknesses. If there were one order of magnitude difference in hydraulic conductivities, then 90% of water would move horizontally through the slag, and only 10% would occur in the underlying material. If there were two orders of magnitude difference, 99% of the total flux would occur through the slag. In other words, the slag will transmit almost all of the groundwater laterally because the most permeable horizontal unit controls the water flux due to lateral (horizontal) gradients



present in the unit. This is true even when the more permeable unit is thinner than the less permeable layers.

Only the slag unit is considered for the purpose of the flux calculation, as most of the water movement off-site will occur in this unit. The thickness of saturated slag is estimated to be about 2 to 2.5 metres, which is the maximum height of the water table above the original ground surface.

In order to estimate the shallow groundwater flux from the slag dump to the various zones of local discharge, the study area was partitioned into five segments, as indicated in Figure 3.6. The boundaries of the segments were based on areas having fairly uniform flow directions (Figure 3.5) and average horizontal hydraulic gradients, with the flux boundaries being perpendicular to flow direction. Horizontal gradients were estimated using water level data from October 4, 1988.

Detailed calculations of flux are provided in Appendix 8 and are summarized in Table 3.3. Groundwater flux through the slag to each of the St. Marys River, West Davignon Diversion Channel, Baseline Road ditch and Bennett Creek is on the order of  $10^5$  to  $10^6$  m<sup>3</sup>/year. These calculations are based exclusively on observed gradients and hydraulic conductivities at the slag site, and do not include any estimate of recharge or source for this water.

Annual recharge volumes over the selected area were calculated using an infiltration rate of 0.4 metres/year for comparison





with the groundwater fluxes. Disposal of pickling liquor and oily water would contribute a recharge of about  $1.3 \times 10^4$  m/year. Although locally significant, this recharge is insignificant compared to infiltration across the site.

Uncertainties and possible sources of error in the above calculations include:

- the estimate of the hydraulic conductivity of the slag, which may be highly variable across the site ( $\pm$  one order of magnitude);
- the horizontal hydraulic gradients, which are subject to fluctuations due to river level changes and on-site effluent disposal ( $\pm 10\%$ );
- the cross-sectional and plan-view areas, which were approximated from Figure 3.11 by using simple geometric slopes ( $\pm 20\%$ ); and,
- the annual infiltration rates, which are also highly variable ( $\pm 50\%$ ).

Despite the uncertainties, however, the estimates of groundwater flow through the slag appear to be reasonable. Within areas D and E, there are slightly larger discrepancies between the calculated flux and the estimated recharge than in the other areas. This may be because a significant flux component exists in the shallow sand and gravel unit which underlies the slag.

Groundwater flow values provide better estimates of off-site movement than infiltration fluxes, because both infiltration and regional discharge components of flux are incorporated into the



estimation procedure by using the total volume of water moving in the groundwater regime. Discharge from the deep flow system is directly evident at the creek bed mini-piezometer sites and indirectly evident at Spring Creek, which exists only because of groundwater discharge. The slag serves to drain both shallow infiltrating water and discharge from the deeper system.

#### 3.2.4 Groundwater Velocities and Residence Times

The average linear velocity ( $v$ ) of groundwater flow from the central (high) slag area to the West Davignon Diversion Channel and St. Marys River in the slag, till and silty sand deposits can be estimated using the relationship:

$$v = \frac{Ki}{n} \quad \text{where } K = \text{Hydraulic Conductivity (L/T)} \\ i = \text{Horizontal Hydraulic Gradient (L/L)} \\ n = \text{Porosity (L}^3\text{/L}^3\text{)}$$

The residence times for groundwater originating in the centre of the slag disposal area, using these velocities, range from 1 to 3 years in the slag, 130 to 160 years in the silty sand, and 850 to 1200 years in the till. The most variable parameter in this calculation is the hydraulic conductivity, which could realistically be one order of magnitude higher or lower than the value assumed above, which would accordingly decrease or increase the residence times by a factor of 10.



#### 4.0 SUMMARY

The results of the hydrogeological study of the slag area are consistent with the original hypothesis which was developed at the outset of this investigation.

Inland of the original shoreline, the water table is controlled by the topography of the original ground surface and is not mounded up in the slag. Within the slag, south of the original shoreline, the water table is governed by the level of the St. Mary's River. Regionally, groundwater flows toward the south/southeast.

Infiltration occurs locally across the site; however, the high horizontal groundwater flux through the coarse slag to the river and surrounding creeks prevents mounding of the water table, and recharge conditions are not apparent. Upward hydraulic gradients exist in the native overburden across much of the site; groundwater from the deeper units discharges to the base of the slag area and migrates through the slag to the river.



## TABLES

TABLE 3.1: VERTICAL HYDRAULIC GRADIENTS AT THE ALGOMA SLAG SITE

| Piezometer<br>Nest Location | Vertical Hydraulic Gradient |                        |
|-----------------------------|-----------------------------|------------------------|
|                             | 04 October<br>1988          | 18, 19 October<br>1988 |
| A1                          | -0.0043                     | -0.0057                |
| A2                          | +0.13                       | +0.12                  |
| A4                          | +0.068                      | +0.019                 |
| A7                          | +0.047                      | +0.046                 |
| B2                          | +0.053                      | +0.058                 |
| B4                          | +0.041                      | +0.040                 |
| C2                          | N/A                         | N/A                    |
| D1                          | +0.0096                     | +0.0084                |
| D3                          | +0.018                      | N/A                    |
| D5                          | +0.026                      | +0.024                 |

N/A - Vertical hydraulic gradients not available because:

- o C2-2 was dry, and
- o water level data at D3 were not obtained.

'+' - upward directed gradient.

'-' - downward directed gradient.

TABLE 3.2: SUMMARY OF HYDRAULIC CONDUCTIVITIES, ALGOMA SLAG SITE

| Hydrostratigraphic Unit | Hydraulic Conductivity (m/s)              |                        |
|-------------------------|-------------------------------------------|------------------------|
|                         | Range                                     | Average                |
| Slag                    |                                           | $5.0 \times 10^{-4} *$ |
| Shallow Sand and Gravel | $1.2 \times 10^{-6} - 1.6 \times 10^{-4}$ | $2.3 \times 10^{-5}$   |
| Till                    | $4.6 \times 10^{-8} - 4.1 \times 10^{-7}$ | $1.7 \times 10^{-7}$   |
| Laminated Clay and Silt | $5.1 \times 10^{-8} - 4.2 \times 10^{-7}$ | $2.3 \times 10^{-7}$   |
| Basal Sand and Gravel   | $7.6 \times 10^{-7} - 1.0 \times 10^{-5}$ | $3.4 \times 10^{-6}$   |
| Bedrock                 | -                                         | $6.2 \times 10^{-9}$   |

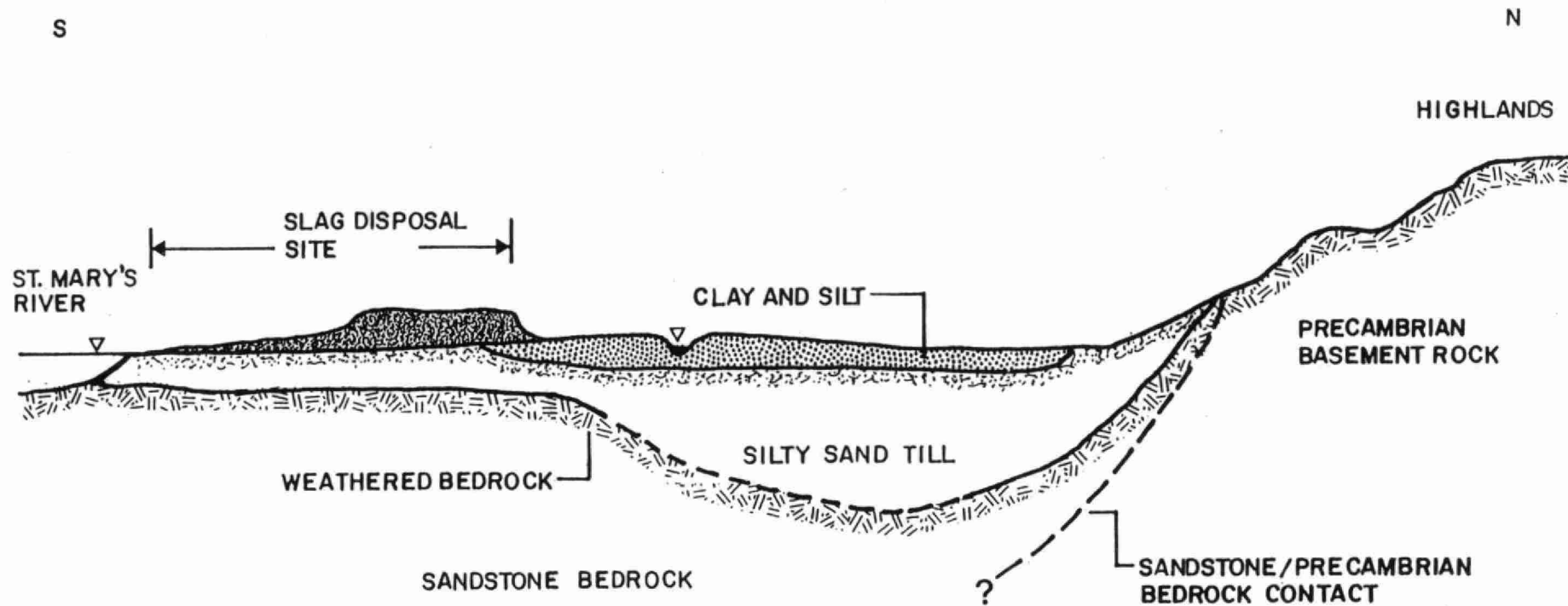
\* Estimated conservative value.

TABLE 3.3: SUMMARY OF FLUX AND RECHARGE CALCULATIONS

| Area                                    | Hydraulic<br>Conductivity<br>K<br>(m/s)             | Horizontal<br>Gradient<br>I<br>(/)      | Vertical<br>X-Sectional<br>Area<br>A <sub>2</sub><br>(m <sup>2</sup> ) | Flux<br>q<br>(m <sup>3</sup> /year) |
|-----------------------------------------|-----------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------|-------------------------------------|
| <b>Estimated Groundwater Flux</b>       |                                                     |                                         |                                                                        |                                     |
| A                                       | $5 \times 10^{-4}$                                  | 0.008                                   | 5,529                                                                  | $7.0 \times 10^5$                   |
| B                                       | $5 \times 10^{-4}$                                  | 0.005                                   | 2,600                                                                  | $2.0 \times 10^5$                   |
| C                                       | $5 \times 10^{-4}$                                  | 0.008                                   | 3,630                                                                  | $4.6 \times 10^5$                   |
| D                                       | $5 \times 10^{-4}$                                  | 0.003                                   | 5,363                                                                  | $2.5 \times 10^5$                   |
| E                                       | $5 \times 10^{-4}$                                  | 0.002                                   | 2,580                                                                  | $8.1 \times 10^4$                   |
| TOTAL GROUNDWATER FLUX                  |                                                     |                                         |                                                                        | $1.7 \times 10^6$                   |
| <b>Estimated Recharge</b>               |                                                     |                                         |                                                                        |                                     |
| Area                                    | Plan<br>Area<br>A <sub>1</sub><br>(m <sup>2</sup> ) | Annual<br>Infiltration<br>I<br>(m/year) | Recharge<br>R<br>(m <sup>3</sup> /year)                                |                                     |
| A                                       | 1,216,425                                           | 0.4                                     | $4.9 \times 10^5$                                                      |                                     |
| B                                       | 469,000                                             | 0.4                                     | $1.9 \times 10^5$                                                      |                                     |
| C                                       | 1,114,574                                           | 0.4                                     | $4.4 \times 10^5$                                                      |                                     |
| D                                       | 998,250                                             | 0.4                                     | $4.0 \times 10^5$                                                      |                                     |
| E                                       | 380,545                                             | 0.4                                     | $1.5 \times 10^5$                                                      |                                     |
| TOTAL ANNUAL RECHARGE                   |                                                     |                                         |                                                                        | $1.6 \times 10^6$                   |
| <b>Estimated Total Groundwater Flux</b> |                                                     |                                         |                                                                        |                                     |
|                                         |                                                     |                                         |                                                                        | Flux q<br>(m <sup>3</sup> /year)    |
| To St. Marys River                      |                                                     |                                         |                                                                        | $1.1 \times 10^6$                   |
| To West Davignon Diversion              |                                                     |                                         |                                                                        | $1.6 \times 10^5$                   |
| To Baseline Ditch                       |                                                     |                                         |                                                                        | $4.8 \times 10^5$                   |
| To Bennett Creek                        |                                                     |                                         |                                                                        | $8.5 \times 10^4$                   |

## FIGURES





**FIGURE 3.1 SCHEMATIC GEOLOGIC CROSS-SECTION**

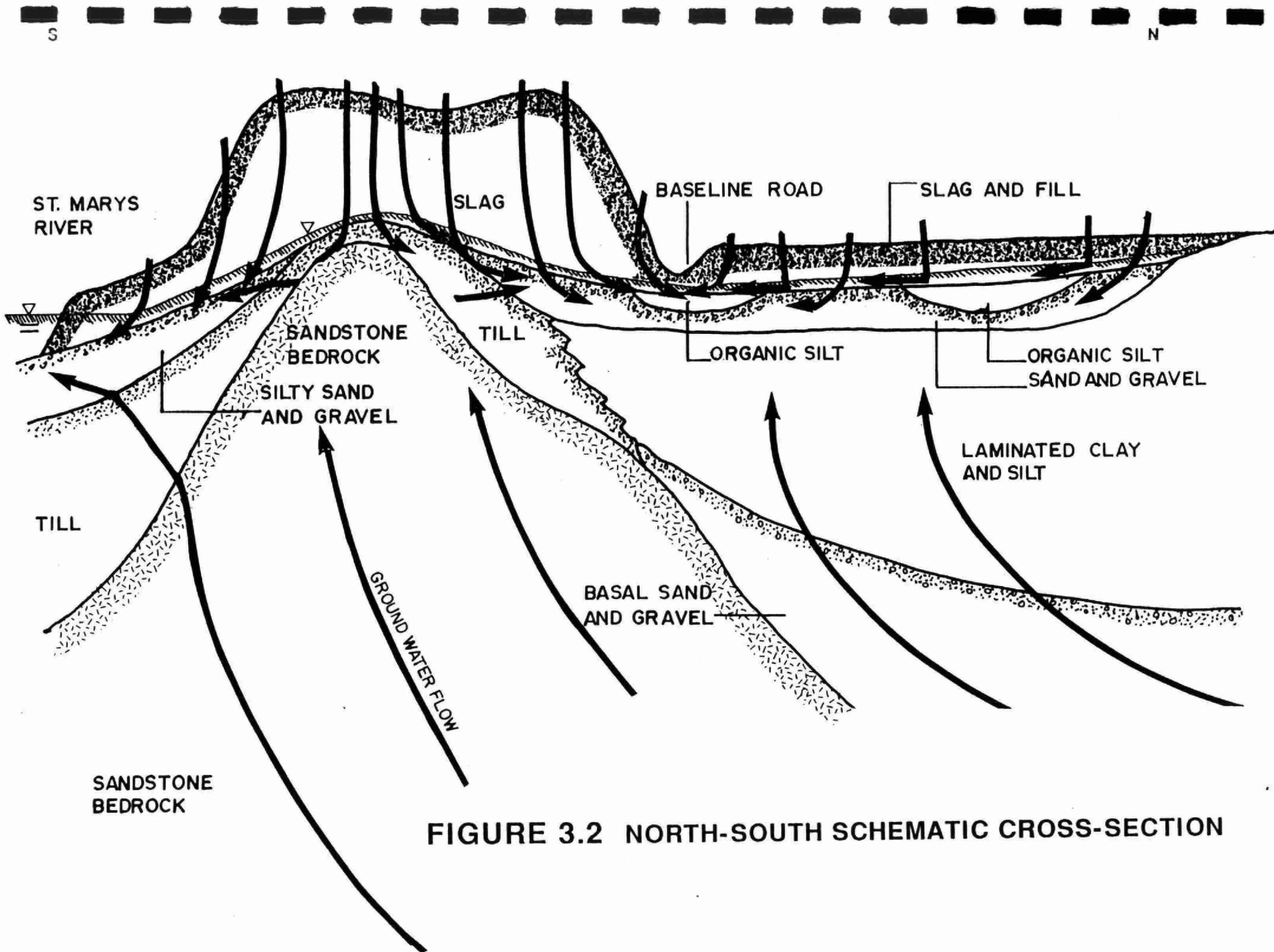


FIGURE 3.2 NORTH-SOUTH SCHEMATIC CROSS-SECTION

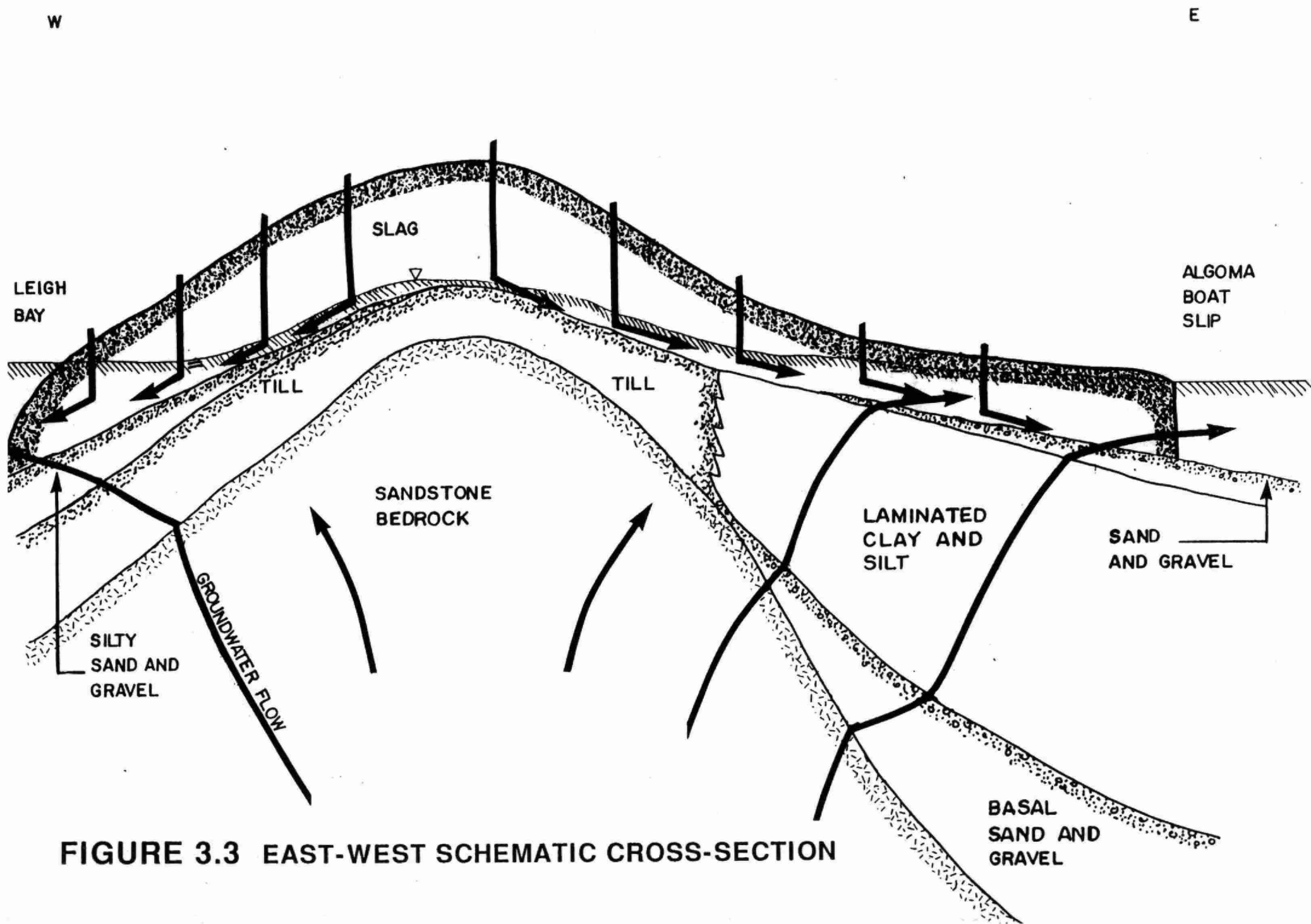


FIGURE 3.3 EAST-WEST SCHEMATIC CROSS-SECTION



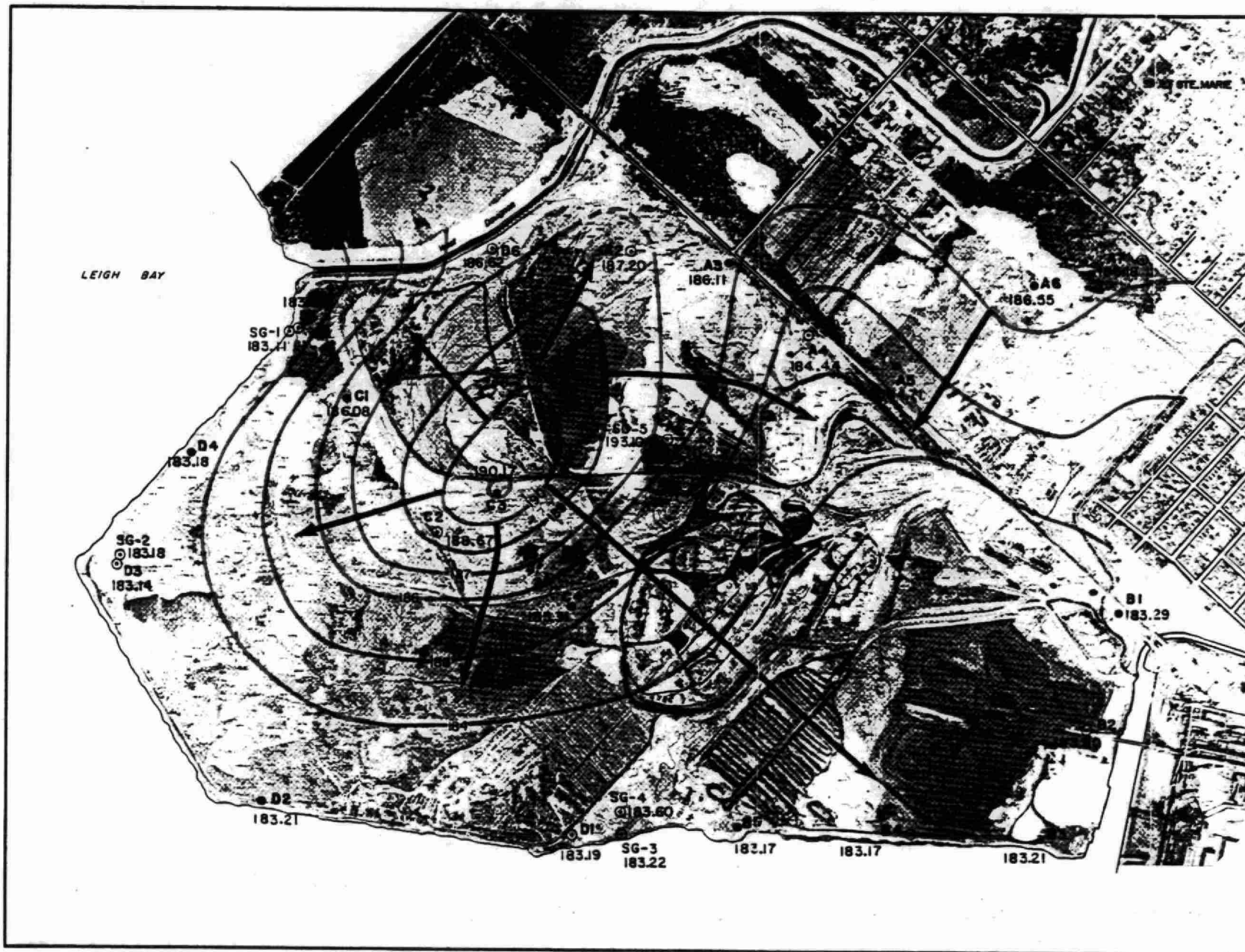


FIGURE 3.5

# Water Table Contour Map

- nested monitors
- individual monitors
- 184.44 shallow water level (Oct. 4/88)
- 185 Water level Contour (metres AMSL)
- direction of shallow groundwater flow



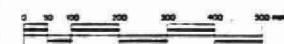




FIGURE 3.6

### Partitioned Areas for Flux Calculations

- nested monitors
- individual monitors
- (A) area
- $i$  = average horizontal hydraulic gradient
- $L$  = length of flux boundary (approx)



## **APPENDIX**

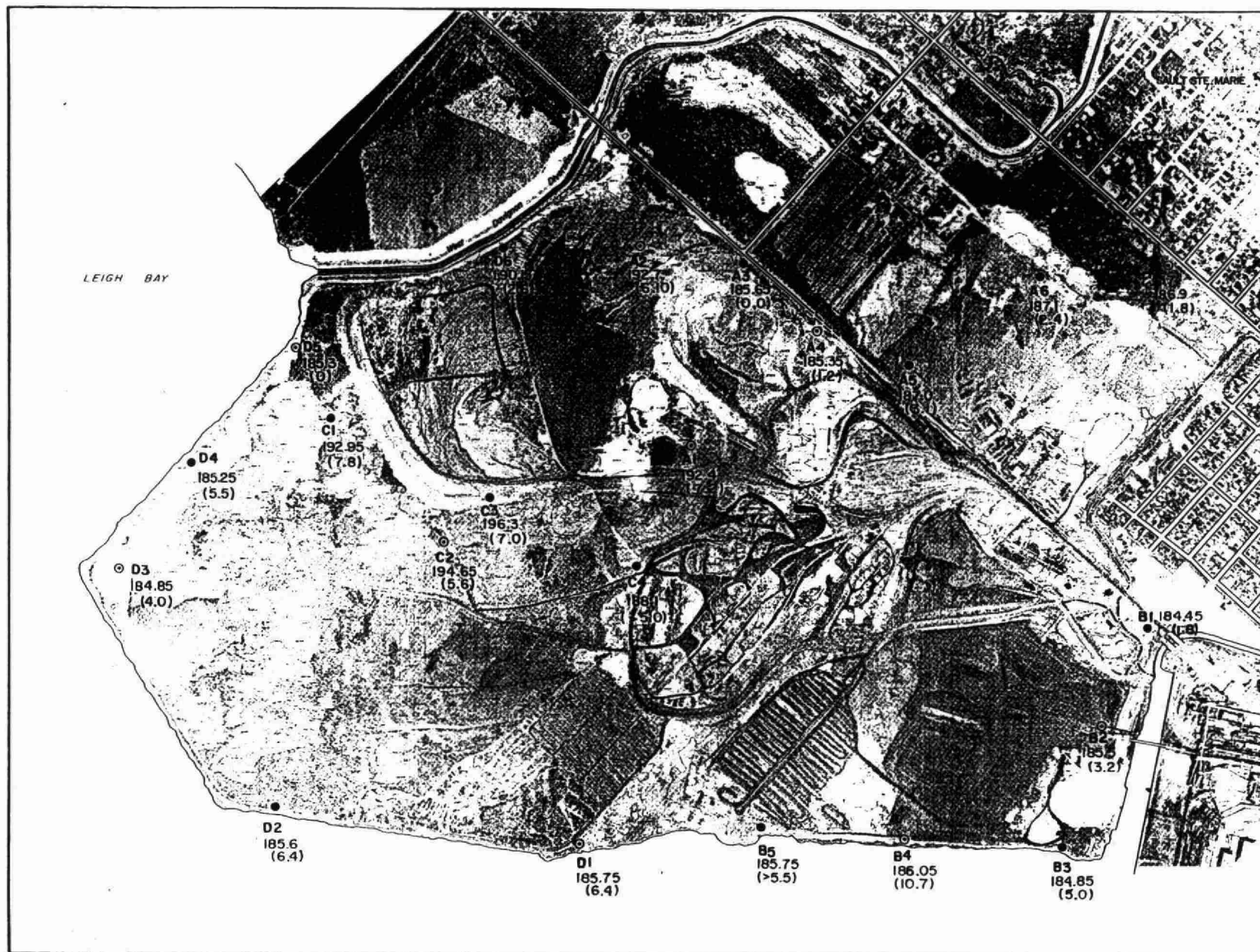
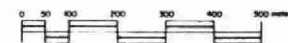


FIGURE A8.1

**Present  
Ground Surface  
Elevation**

- ⊙ nested monitors
  - individual monitors
- note:  
ground surface elevation  
rounded up to nearest  
5 cm (metres)
- ( ) thickness of slag or fill  
in metres





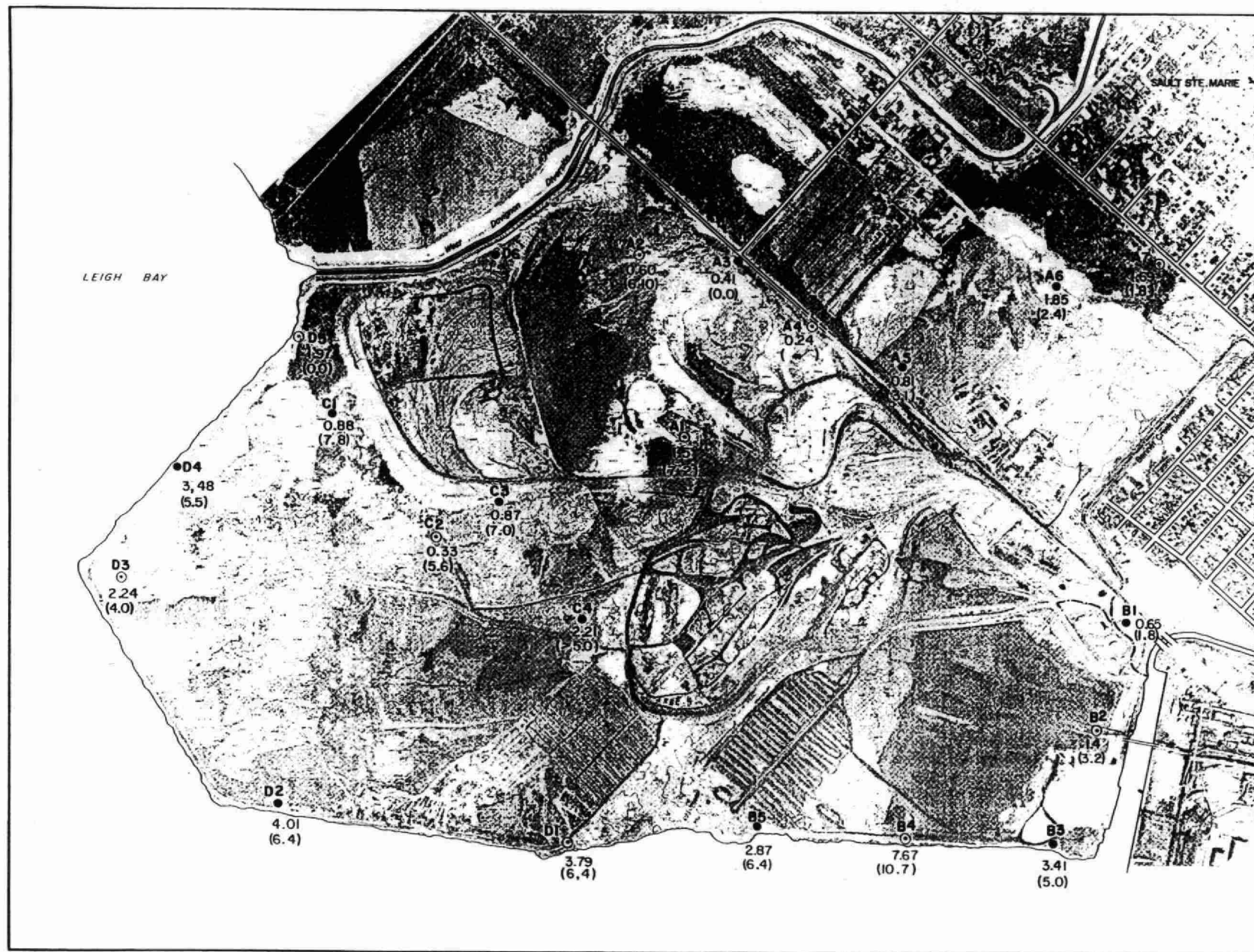


FIGURE A8.2

# Shallow Groundwater Level to Original Ground Surface

- ⊙ nested monitors
- individual monitors
- 1.6 depth of water table  
+ above ground surface  
- below ground surface  
(metres)
- (0.8) thickness of slag/fill

water level as of 88/10/04

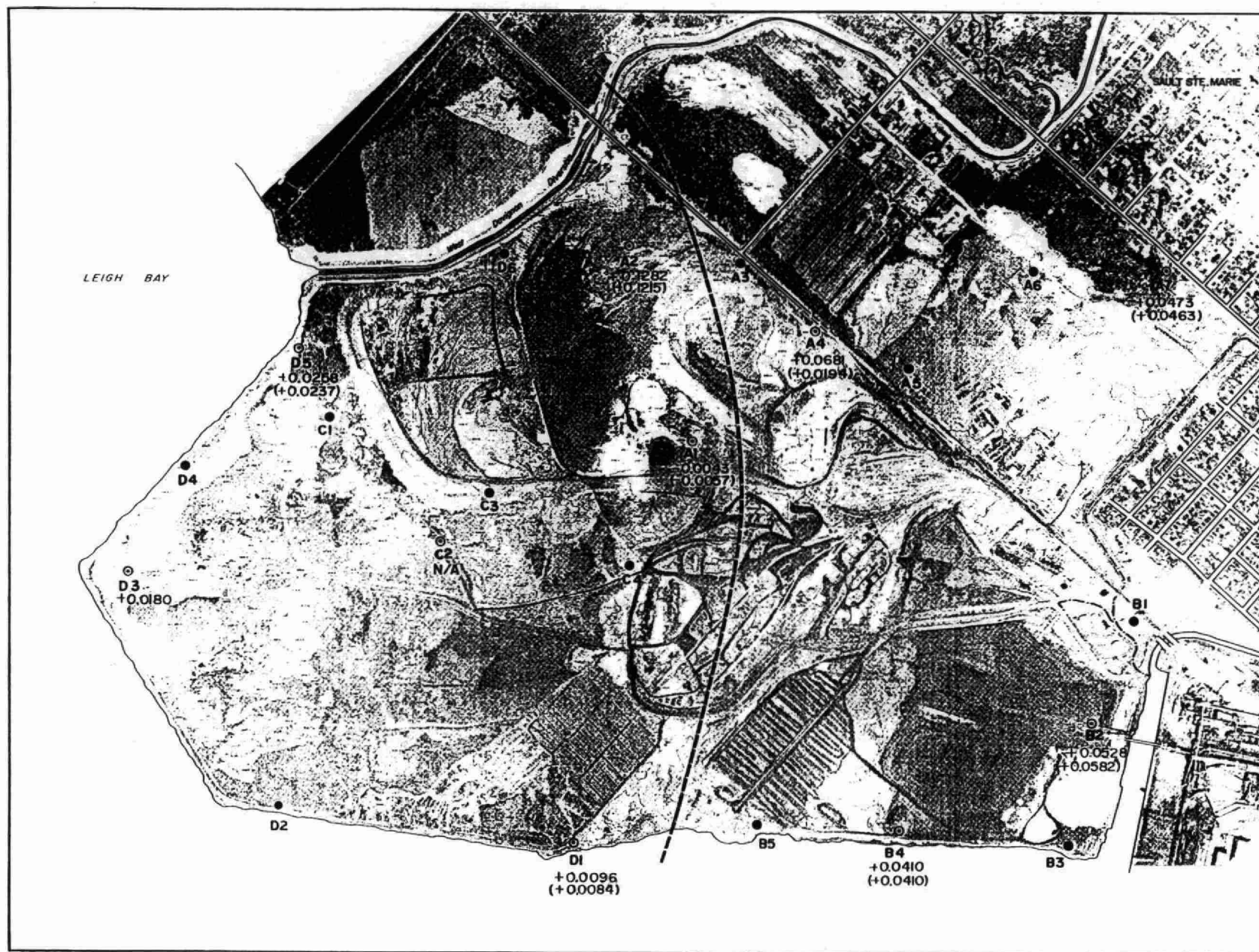


FIGURE A 8.3

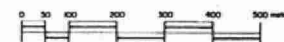
# Vertical Hydraulic Gradients

- +ve - upward
- ve - downward
- ⊙ nested monitors
- individual monitors

0.0 calculated from Oct. 4/88 water level data

(0.0) calculated from Oct. 18/88 water level data

--- Southwestern limit of clay/silt unit



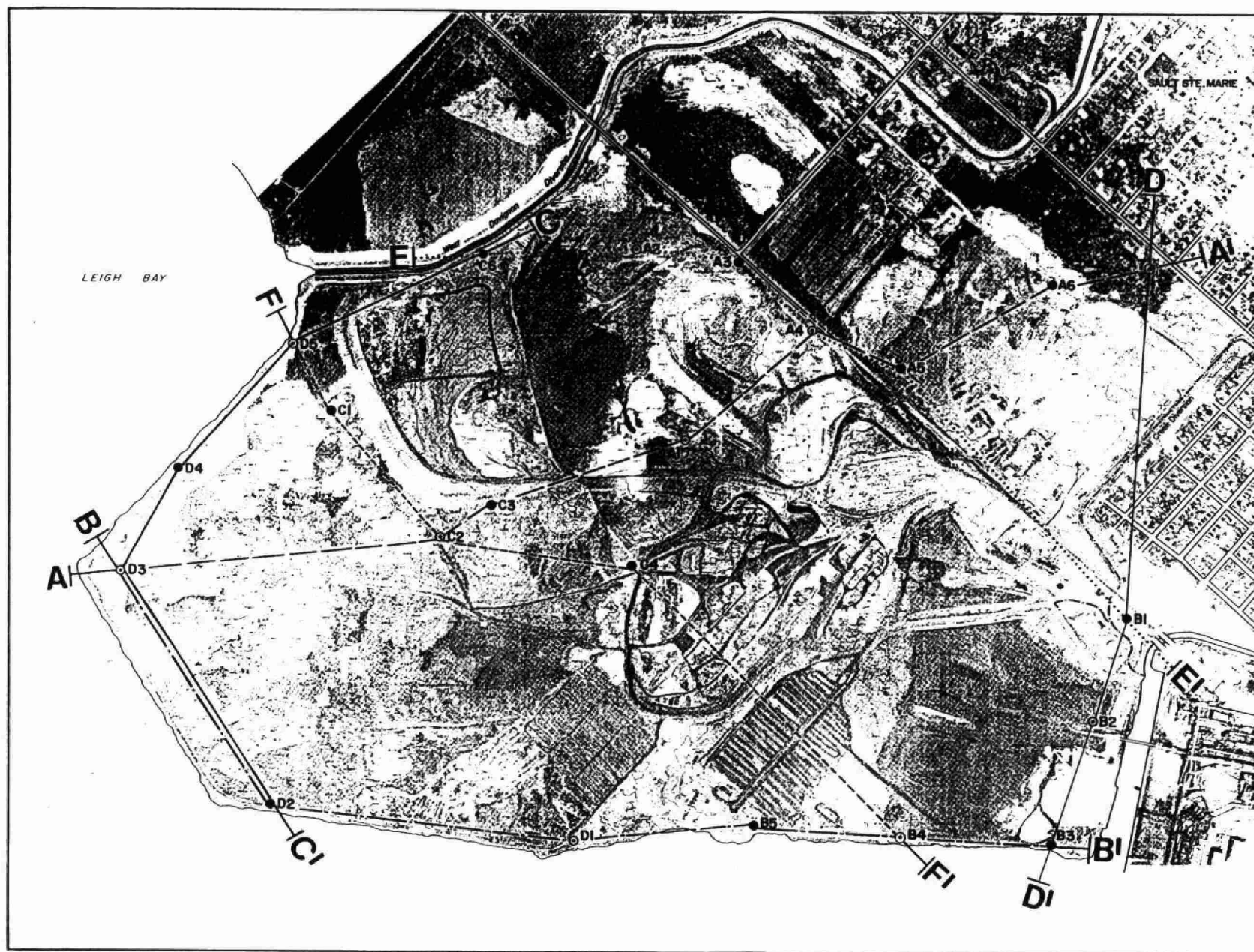


FIGURE A 8.4

Cross Section Locations

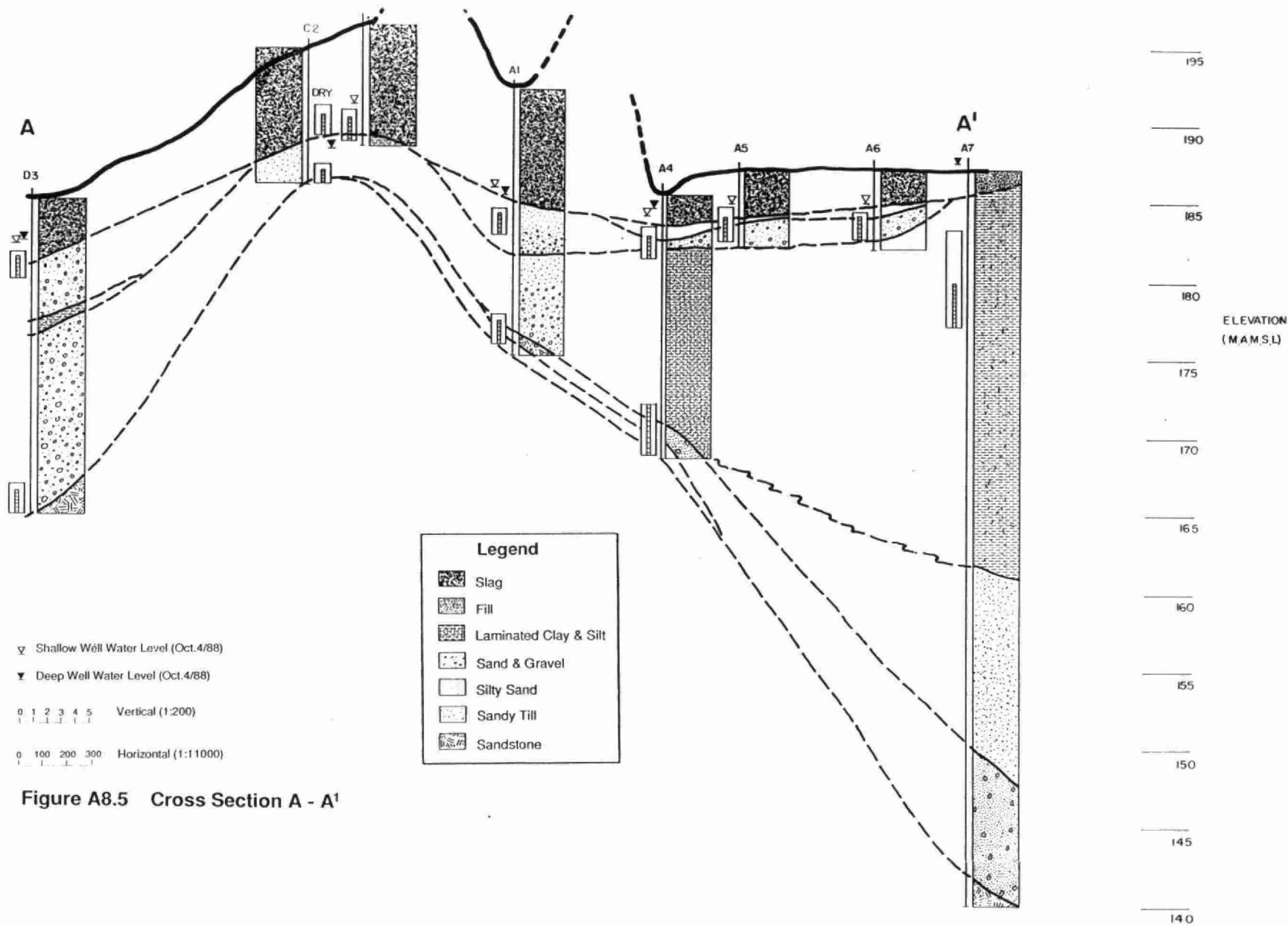




Figure A8.6 Cross Section B - B'

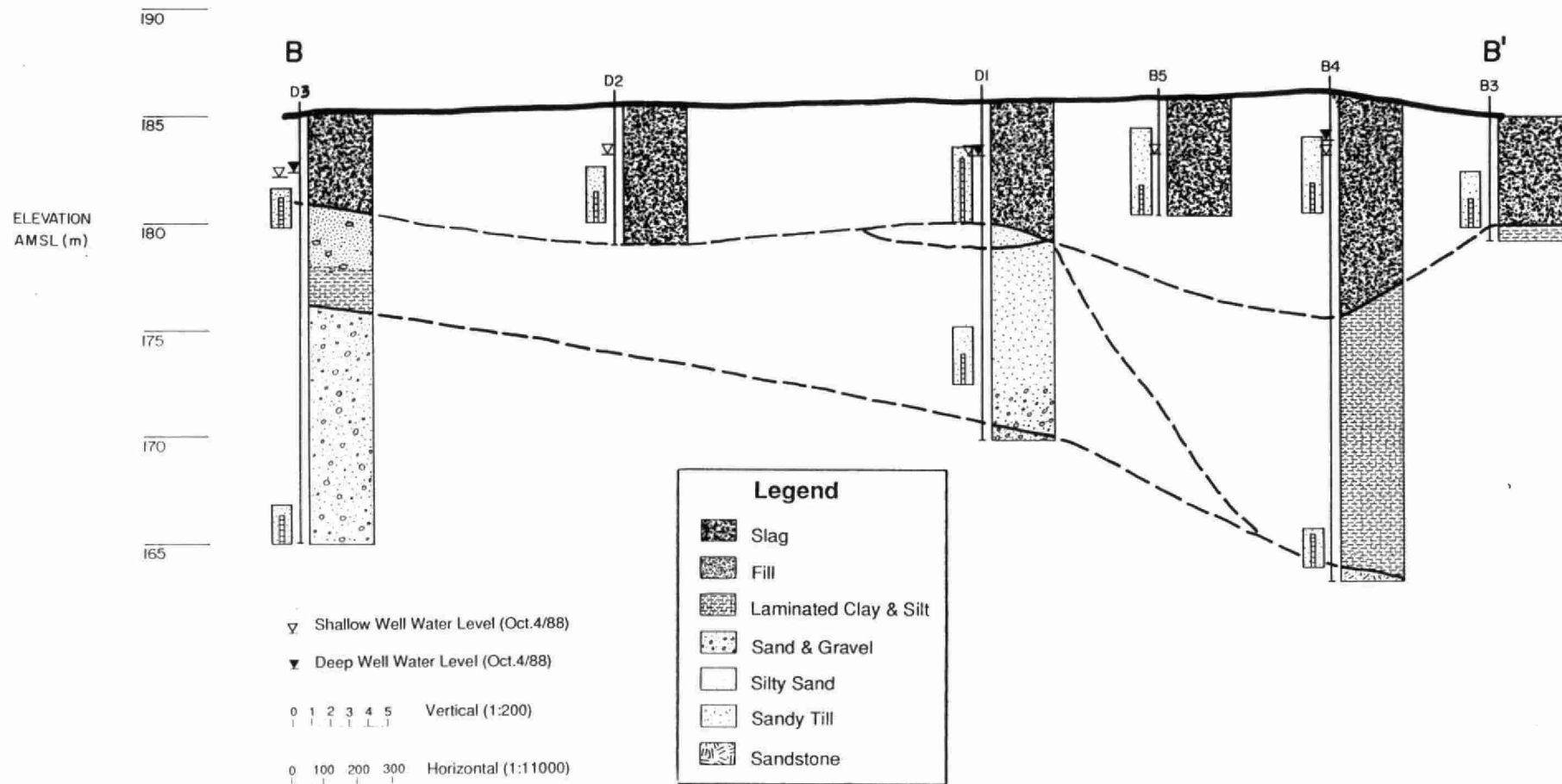


Figure A8.7 Cross Section C - C'

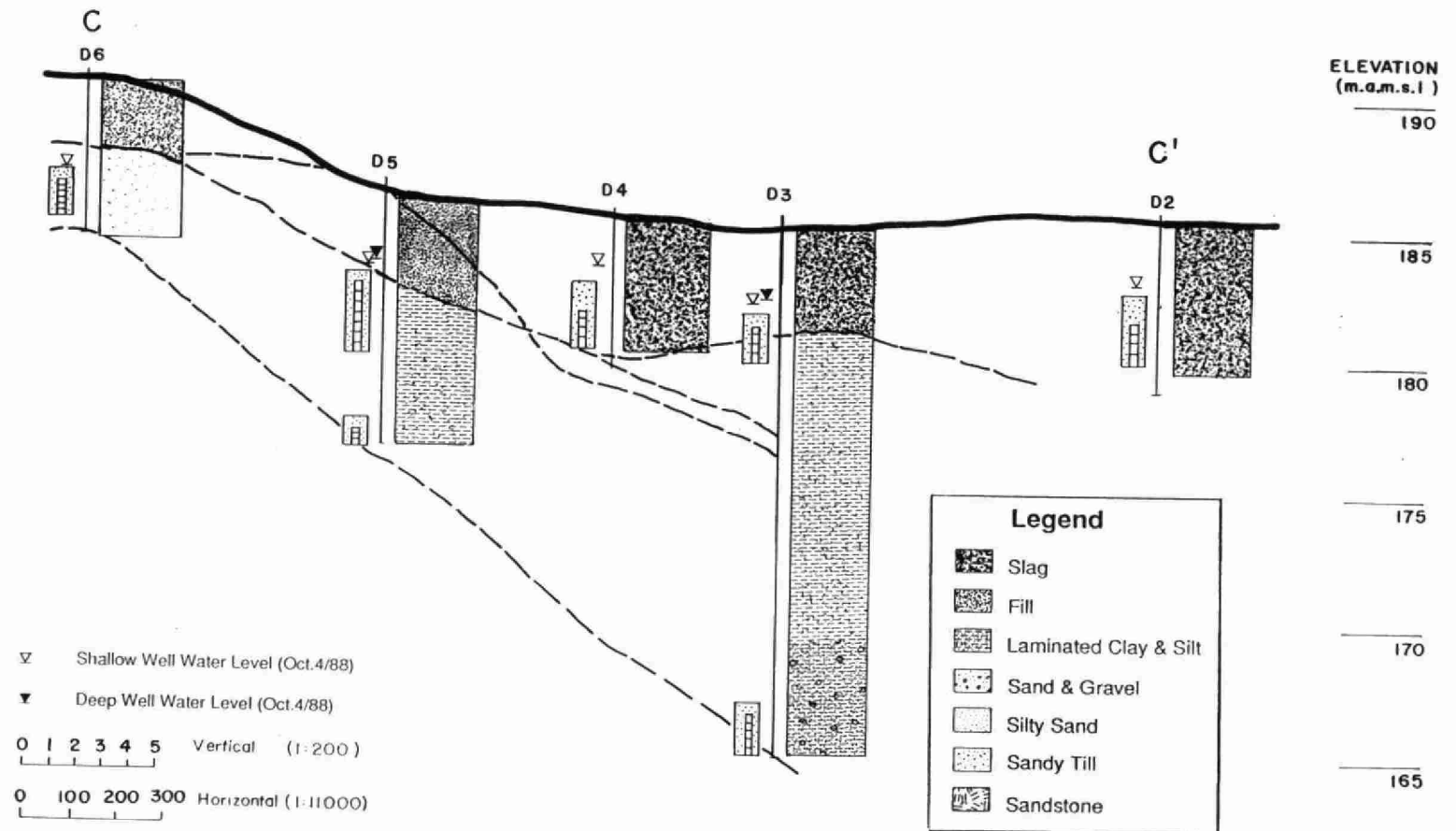


Figure A8.8 Cross Section D - D<sup>1</sup>

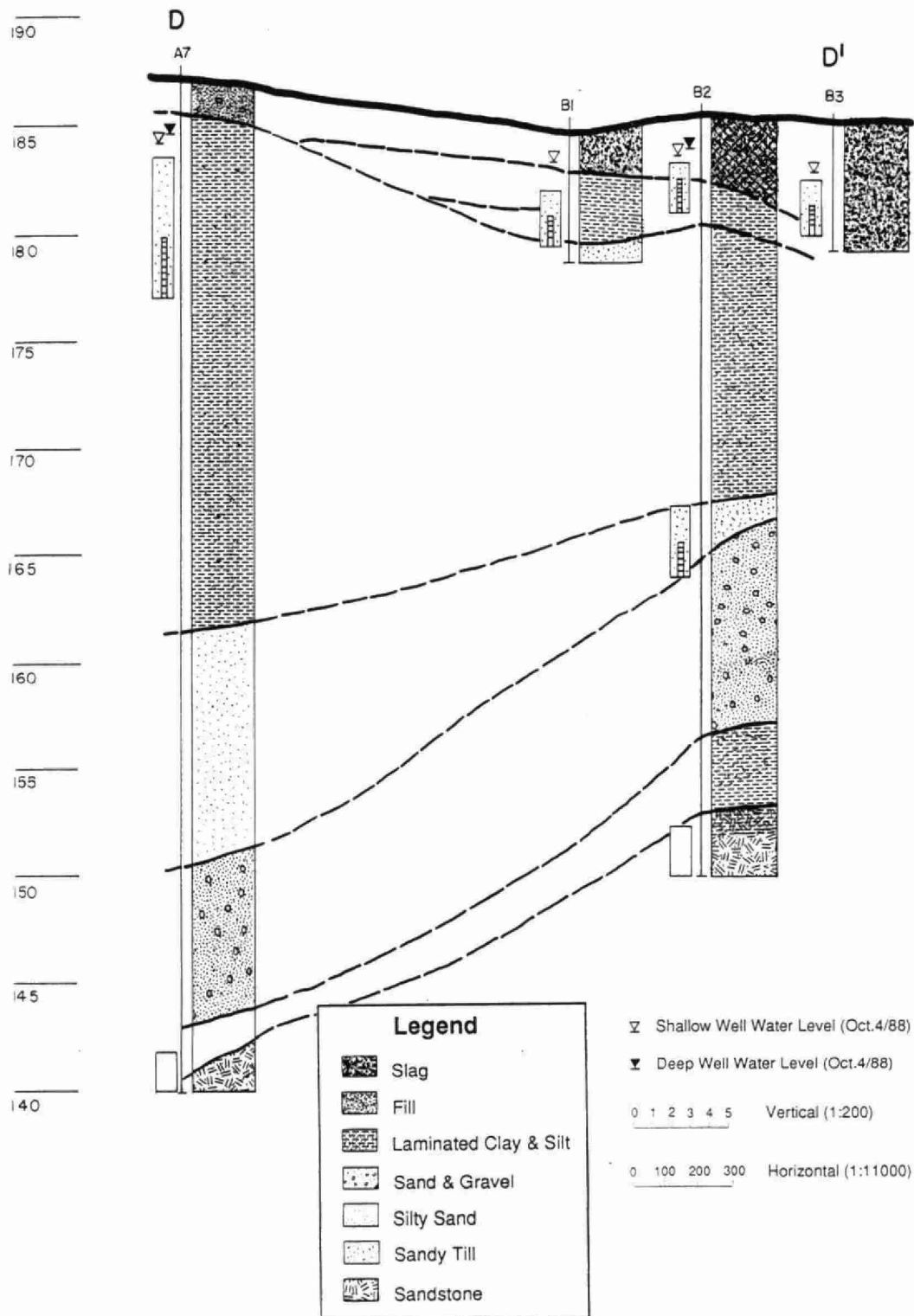


Figure A8.9 Cross Section E - E'

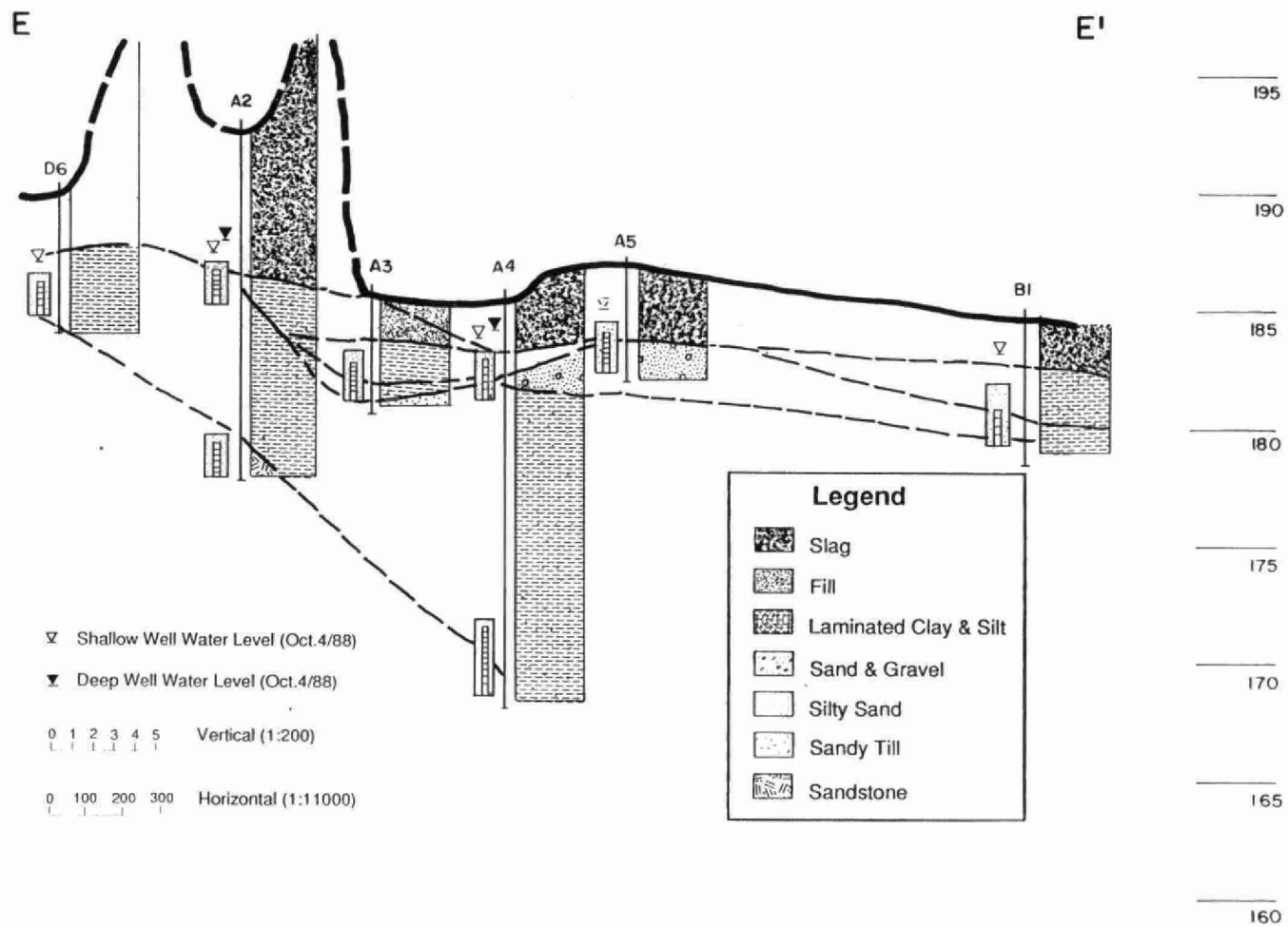
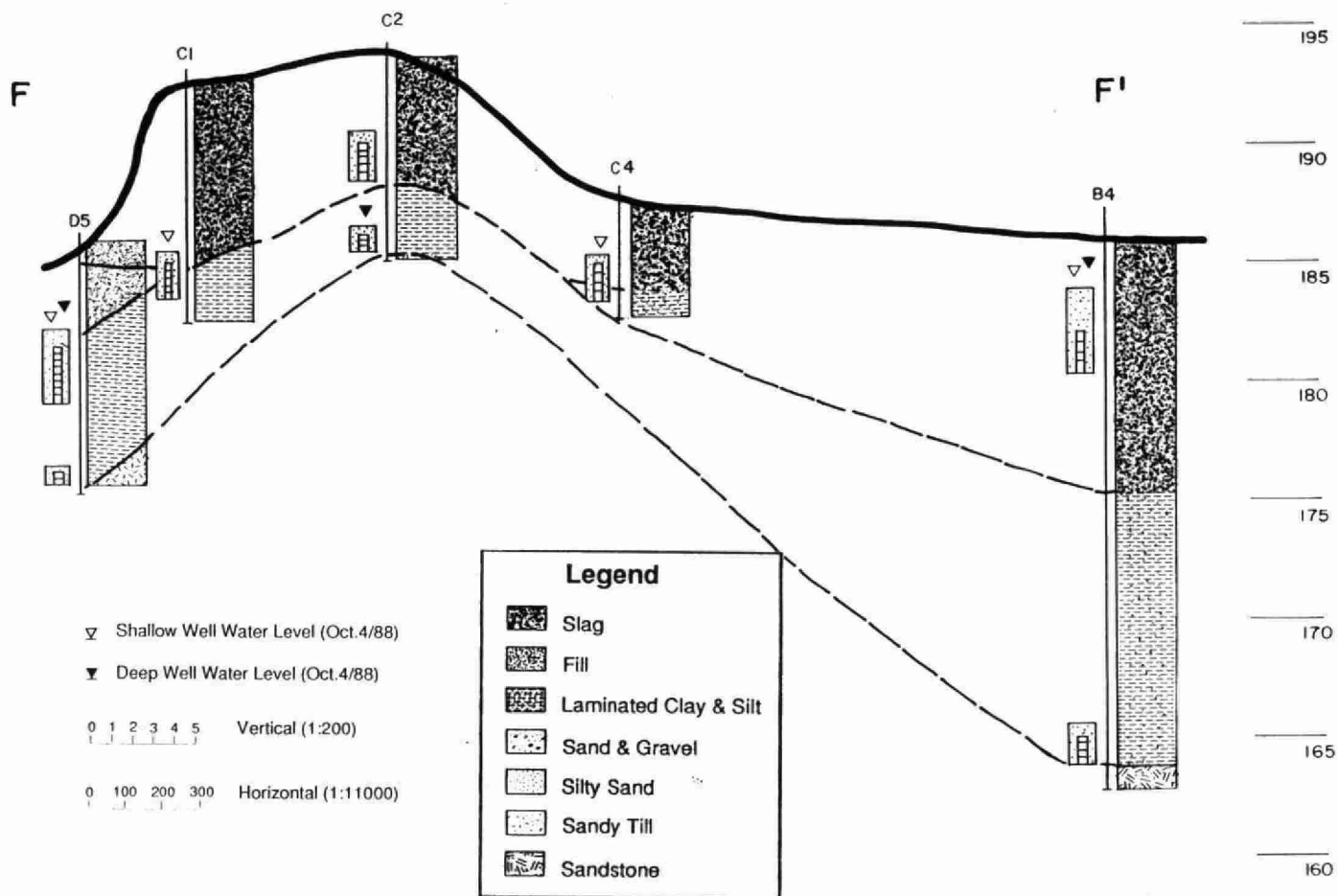




Figure A8.10 Cross Section F - F'



**SEEPAGE STUDY**

**BY**

**D.R. LEE**

**CHALK RIVER NUCLEAR LABORATORIES**

**SEPTEMBER 1988**

REPORT ON SEEPAGE INVESTIGATION

13 JULY TO 20 JULY 1988  
ON ALGOMA STEEL CORP. SHORELINE  
ST. MARYS RIVER

BEAK CONSULTANTS LIMITED  
14 ABACUS ROAD  
BRAMPTON, ONTARIO L6T 5B7  
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CRNL REFERENCE 93324

1988 September 15

## SUMMARY

This is part of a current study to assess the offsite migration of groundwater solutes from the Algoma Steel Corp. This work was done in support of Beak in their larger contract for the Ministry of the Environment.

Seven additional targets for possible future hydrogeological work were identified on the basis of elevated electrical conductance (EC) on the bed of the St. Marys River.

Three piston cores of sediment were recovered, photographed, visually logged and packaged for possible later analyses by Beak. Sediment conditions at several EC anomalies were not conducive to further investigation from the river; cobbles, stones, or chunks of slag interfered.

Four piezometers were installed near the barge in Leigh Bay and 1 piezometer within a kilometre of the Algoma slip near the east end of the site. These piezometers produced water of elevated electrical conductance, and they were sampled by us for analyses by Beak. Field EC values ranged from 340 to 2650  $\mu\text{S}/\text{cm}$  in these groundwaters as compared with the river at 80  $\mu\text{S}/\text{cm}$ . Seven piezometers, emplaced a year before (Lee and Welch, contract report), were recovered and anchored on shore for Beak to sample as required.

Seepage meters were used to demonstrate and quantify the upwelling of groundwater at 2 sites, Site A and Site 1. Site 1 was studied in 1987 but seepage had never been conclusively proven. Upward rates of groundwater discharge were 13 m/yr at Site 1 and 3 m/yr at Site A. If one assumes a porosity of 0.33, these measurements can be multiplied by 3 for ballpark estimates of interstitial flow.

## SEDIMENT RECONNAISSANCE

A sediment electrical conductance survey (Lee, 1985) was conducted along lines parallel to shore at distances offshore of 10, 20, 30, 50, 75 and 100 m. Before doing the survey, shoreline reference numbers were painted on shore at 200 m intervals to aid in relating strip chart records to known positions (Figure 1). To keep survey lines on course, flagged buoys were placed on lines perpendicular to shore at 400 m intervals. Significantly elevated electrical conductance (EC) was observed at the following locations:

Site C - 20 m offshore at reference 1 (see Figure 1 for location shoreline reference points)

20 m offshore at reference 4.3 and 4.5

20 m offshore at reference 7.5

30 to 100 m offshore at reference 13

Site A - 10 m offshore north of the barge and within 20 m of it at reference 3. Four piezometers (A1,A2,A3,A6) were installed. A sketch of Site A is in the Section on Core Results. Using SCUBA we found that the sediment surface in this area was lightly encrusted (probably  $\text{CaCO}_3$ ) and was stony but cores (A4,A5) were taken between gravelly areas.

Shore Reference 17.3 -  $\approx$  10 m offshore at the toe of the slag at reference 17.3.

Site B -  $\approx$  10 m offshore at the toe of the slag at reference 16.2. A 2.8 m core was taken and a piezometer (B1) was installed.

Other sediment areas displayed elevated electrical conductance too, but time did not permit us to mark them and attempt further study.

## PIEZOMETER RESULTS

Four piezometers (A1,A2,A3,A6) were installed using the method of Welch and Lee (in press) at Site A, 10 m offshore and immediately north of the two barges at reference 3 (Figure 1). Heads were not obviously above river level, but porewater electrical conductance ranged from 865 to 2650  $\mu\text{S}/\text{cm}$ . This was evidence of the upward motion of slag leachate at that site.

At shore reference 17.3 (Figure 1) about 10 m offshore at the toe of the slag, the sediments "felt" silty to 1.2 m below the sediment water interface. However chunks of slag or other stones prevented piezometer installation and coring. See Photo 3.

At Site B (about 10 m offshore at reference 16.2, Figure 1) a single piezometer (B1) was installed. Electrical conductance of a sample pumped from this piezometer was 340  $\mu\text{S}/\text{cm}$ . Although the static head was not clearly positive relative to river, earlier experience with such piezometers along this shore has been that the gradient is too low and the piezometer screen is too shallow to show an obvious meniscus above the river. Attachment of submerged, flexible plastic bags to other such piezometer lines and measurement of flow into the bag provided evidence of upward potentials elsewhere along this shore in 1987.

At the above Site C and 20 m offshore at references 4.3 and 4.5, piezometers were installed but porewater could not be withdrawn due to low permeability material (probably silt). At these sites there may be: a) a thin lens of sand conducting leachate offshore (but this is missed with the piezometers unless detailed coring is done), or b) seepage from the toe of slag and this diffuses into the surrounding sediments.

Within the large EC anomaly 30 to 100 m offshore at reference 13, several hours were spent probing with an E-rod. Results confirmed the existence of soft sediment (10 to 20 cm thick) over cobble. Because methods do not exist for offshore manual installation of piezometers or cores in cobble, the effort to instrument and sample this site was abandoned.

A nearby area, Site 1 (reference 13.25), was not included in the sediment survey because we did not wish to disturb seven existing piezometers and lines to shore. This area was intensively investigated in 1987 (Figure 2). An MOE diver had anchored the piezometer lines (copper and polyethylene) at the shore in November 1987. We recovered these piezometer tubes, anchored them at the shoreline, made several measurements of head and collected water samples. Results summarized in Table 1 show that this site is an example of strong groundwater upwelling. Stratigraphic information should be obtained on the adjacent land and the groundwaters both on land and beneath the river should be included in the chemical data base for the Algoma study program.

Table 1. Summary of Information from Offshore Piezometers

| Piezometer Number | Location                                                        | Depth of Screen Below Riverbed, m | Head Relative to River Surface, cm              | Field Electrical Conductance, $\mu$ S |
|-------------------|-----------------------------------------------------------------|-----------------------------------|-------------------------------------------------|---------------------------------------|
| A1                | Site A, next to barge, reference point 3, Figure 3              | $\approx 1$                       | -0.5                                            | 2080                                  |
| A2                |                                                                 | 0.75                              |                                                 | 1200                                  |
| A3                |                                                                 | 0.80                              |                                                 | 865                                   |
| A6                |                                                                 | $\approx 1$                       |                                                 | 2650                                  |
| B1                | Site B $\approx 40$ m east of reference 16 at toe of slag       | 2.8                               | $\pm 1$ , not obviously different               | 340                                   |
| C1                | Site C $\approx 20$ m offshore at rebar at reference 1          | $\approx 1$                       | no response, this piezometer is of little value | -                                     |
| P30               | See Figure 2, Site 1, $\approx 50$ m east of shore reference 13 | 1.3                               | +6.0 (+27.5*)                                   | 1540                                  |
| P46               |                                                                 | 2.3                               | -                                               | -                                     |
| P47               |                                                                 | 2.3                               | +4                                              | 1424                                  |
| P48               |                                                                 | 2.3                               | +8.5                                            | 475                                   |
| P49               |                                                                 | 2.3                               | +9.5 (+3.4*)                                    | 466                                   |
| P50               |                                                                 | 2.3                               | +4.7                                            | 1640                                  |
| P51               |                                                                 | 2.3                               | +7.7                                            | 1730                                  |
| P52               |                                                                 | 2.0                               | 9.0                                             | 1290                                  |

\*head measurements 27.5 and 34 cm above river were made during a wind-related event Saturday, July 16

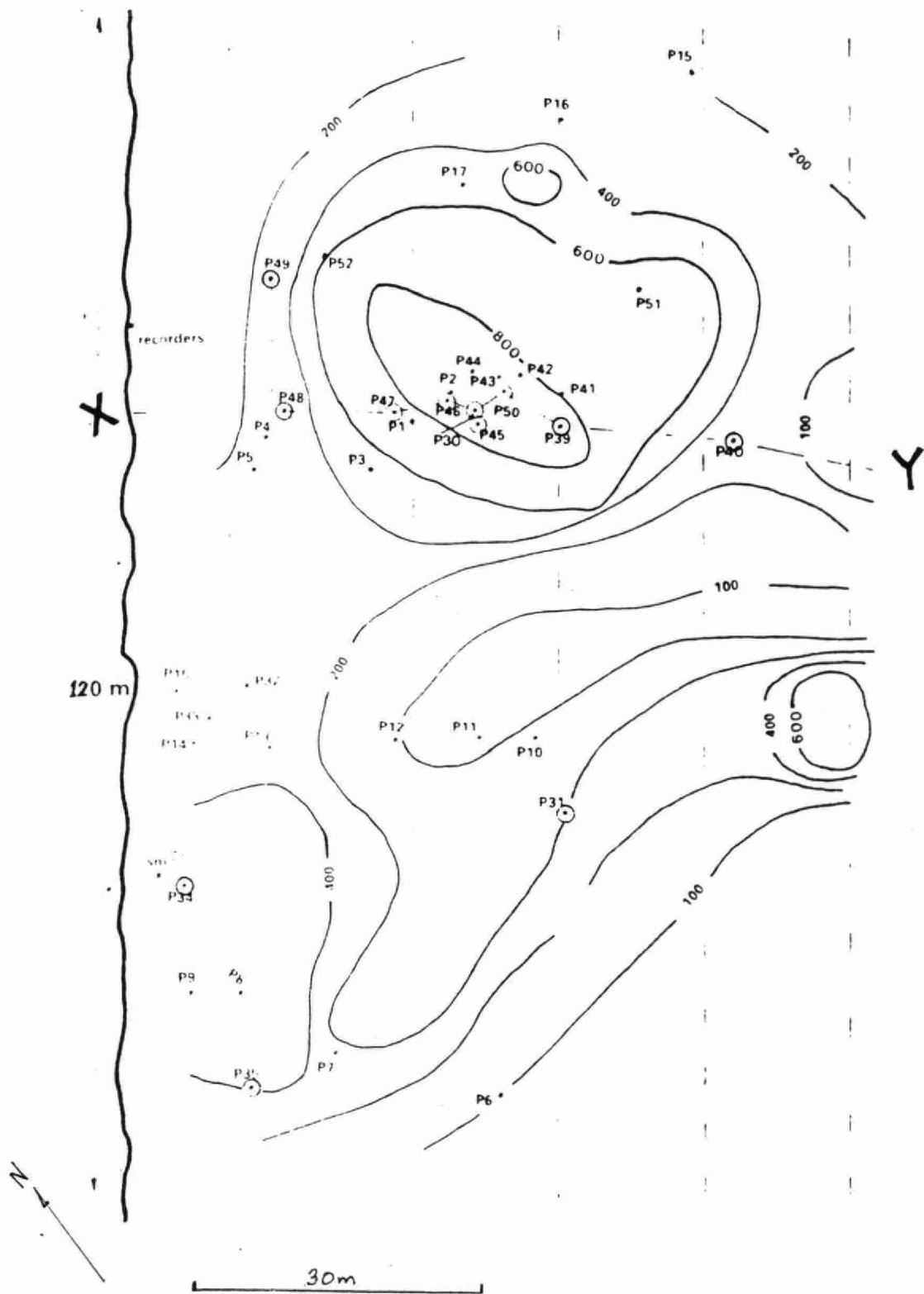


FIGURE 2. Site 1 instrument, core locations and sediment electrical conductance contours. (From contract report by Lee and Welch.)



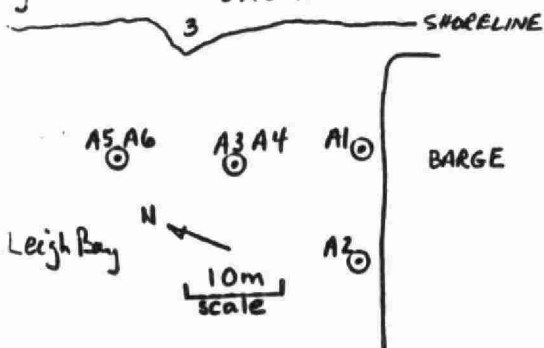
## SEDIMENT CORES

These are the results of cores of the St. Marys Riverbed near Algoma Steel Corp. Refer to Figure 1 for locations and sites.

### LOCATION A4

SITE A  
DATE 880718  
WATER DEPTH 2.25 m  
CORE LENGTH 0.3 m

Fig. 3 Sketch of site A.



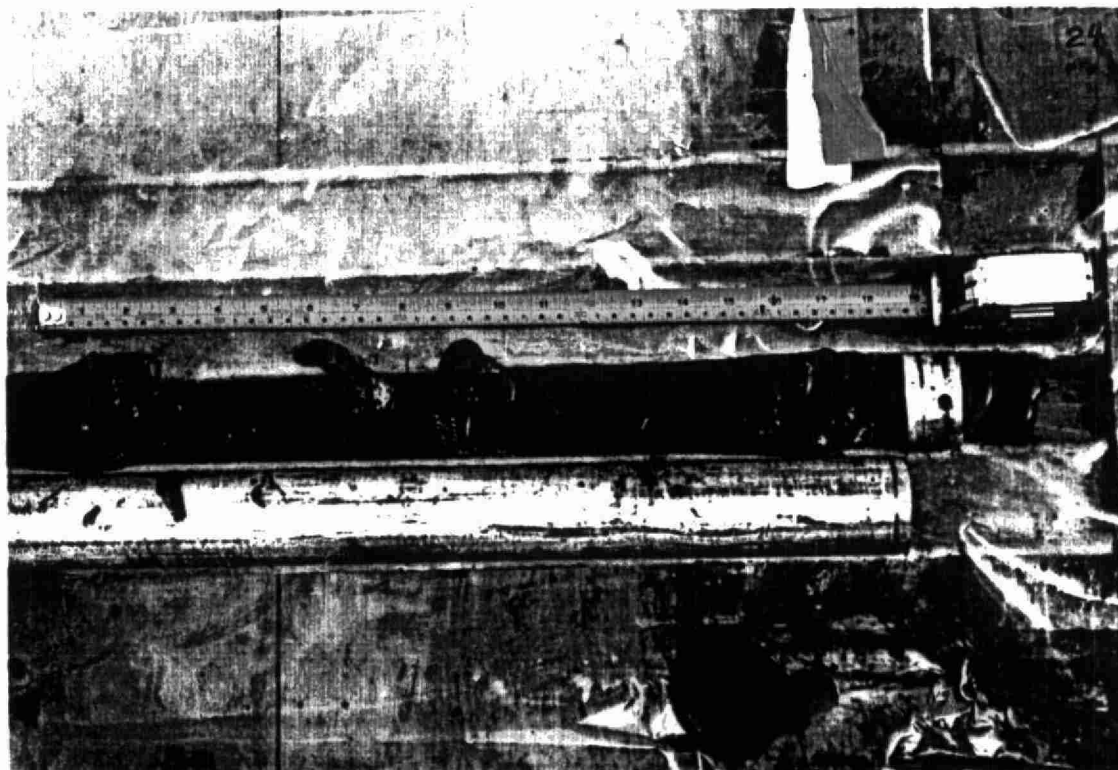
### Depth. cm

0-30

### Notes

red-brown, poorly-sorted  
silty sand with slag  
chunks up to 2.5 cm  
diameter

COLOUR PHOTO 24



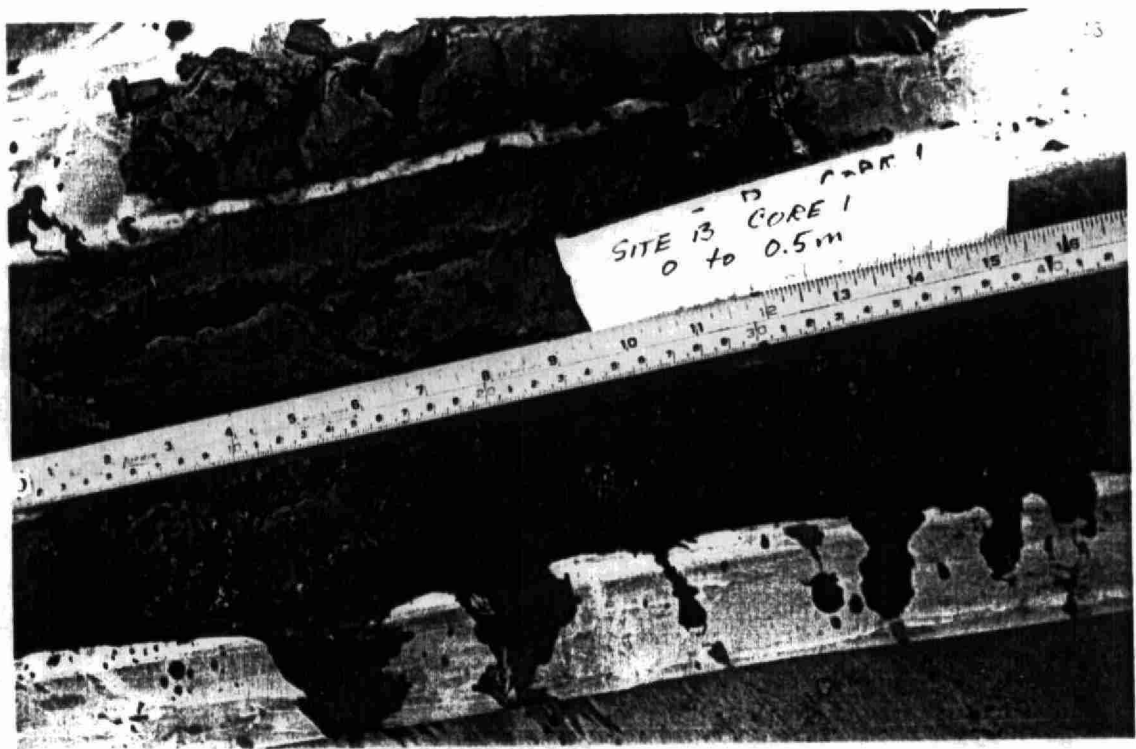
COLOUR PHOTO 12



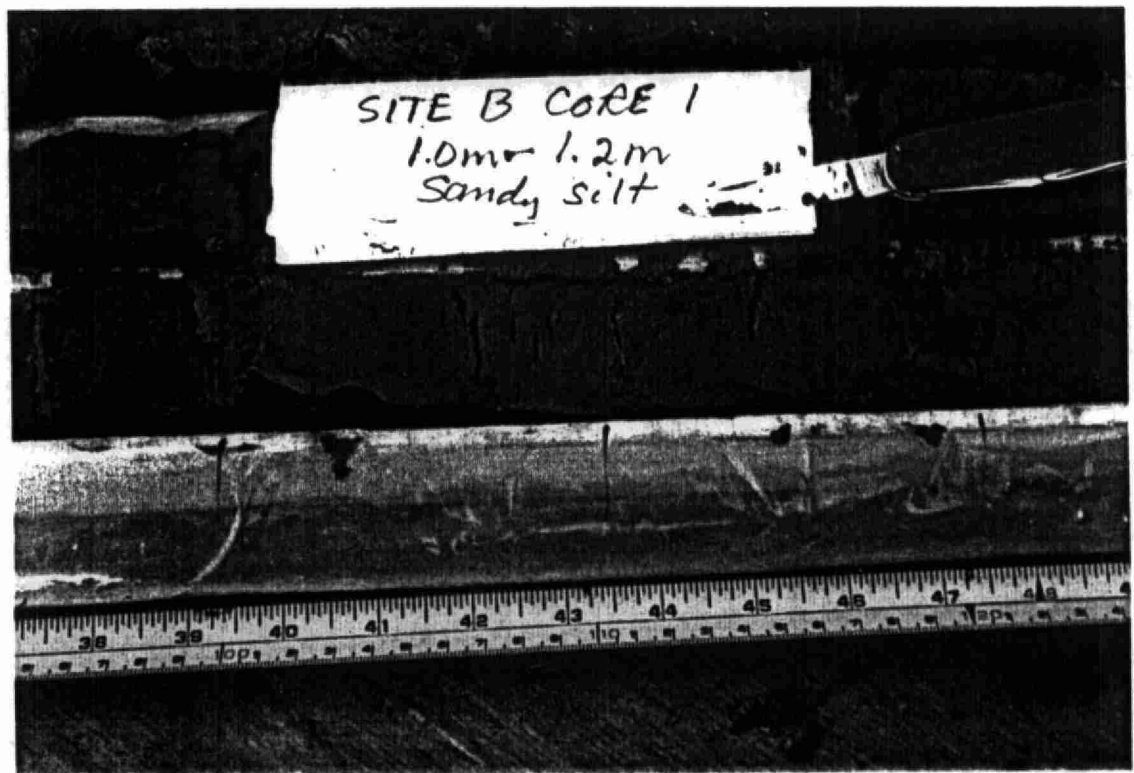
COLOUR PHOTO 9



COLOUR PHOTO 13



COLOUR PHOTO 15



LOCATION (17.3 m on shoreline)

SITE F  
DATE 880718  
WATER DEPTH  $\approx 3$  m  
CORE LENGTH none

An electrical conductance anomaly was found along the toe of the slag in  $\approx 3$  m of water. Coring was not attempted because we could not install piezometers due to rocks within a soft sediment.

Photo 3 shows one piezometer tip after an aborted installation.

COLOUR PHOTO 3





FIGURE 1. Map of slag site showing positions of shoreline reference points which were painted on shore to aid sediment and seepage work.

# LOCATION A5

SITE A  
DATE 880718  
WATER DEPTH  $\approx$  2 m  
CORE LENGTH  $\approx$  0.8 m

| <u>Depth, cm</u> | <u>Notes</u>                                                                                                   |
|------------------|----------------------------------------------------------------------------------------------------------------|
| 0-60             | poorly-sorted coarse to fine sand with rounded pebbles to 1 cm diameter and slag chunks                        |
| 60-80            | poorly-sorted red-brown medium to fine sand with silt and chunks of red-brown medium to fine grained sandstone |

# LOCATION B1 ( $\approx$ 16.2 m along shoreline)

SITE B  
DATE 880719  
WATER DEPTH 2.5 m  
CORE LENGTH 2.8 m

| <u>Depth, cm</u> | <u>Notes</u>                                               |
|------------------|------------------------------------------------------------|
| 0-50             | black ooze<br>(photo 13 below)                             |
| 50-260           | dark brown, fine sandy silt (photos 15 and 12 below)       |
| 260-280          | poorly-sorted medium to fine brown sand<br>(photo 9 below) |

## SEEPAGE MEASUREMENTS

Seepage meters (Lee, 1977) were constructed from plastic drums. The meters were 0.152 m<sup>2</sup> in area and 60 cm in length. The length was needed for installation into the firm sand that lies beneath the soft surficial sediment in some areas. Specific discharge rate averaged 0.4  $\mu\text{m/s}$  or 13 m/yr at Site 1 and 0.1  $\mu\text{m/s}$  or 3 m/yr at Site A (Table 2)

## REFERENCES

1. METHOD FOR LOCATING SEDIMENT ANOMALIES ON LAKEBEDS THAT CAN BE CAUSED BY GROUNDWATER FLOW  
D.R. Lee  
J. Hydrol. 79, 187-193 (1985)
2. RESEARCH AND DEVELOPMENT OF METHODS FOR LOCATING AND ESTIMATING CONTAMINANT LOADING VIA GROUNDWATER ENTERING THE ST. MARYS RIVER  
D.R. Lee and S.J. Welch  
Contract report. Penultimate draft submitted to MOE (1988)
3. A METHOD FOR INSTALLING AND MONITORING PIEZOMETERS IN BEDS OF SURFACE WATERS  
S.J. Welch and D.R. Lee  
Ground Water (in press)



Table 2. Seepage Meter Results at Sites 1 and A

| Seepage Meter | Location                                                               | Time of Measurement, hr. | Volume of Water Displaced through the meter, L | Calculated Specific Discharge, $\mu\text{m/s}$ |
|---------------|------------------------------------------------------------------------|--------------------------|------------------------------------------------|------------------------------------------------|
| A             | a cluster of four meters placed 2 m apart at Site 1 near P30, Figure 2 | 0.37                     | 0.10                                           | 0.50                                           |
|               |                                                                        | 0.23                     | 0.34                                           | 0.27                                           |
| B             |                                                                        | 0.37                     | 0.125                                          | 0.62                                           |
|               |                                                                        | 0.23                     | 0.25                                           | 0.20                                           |
| C             |                                                                        | 0.37                     | 0.035                                          | 0.17                                           |
|               |                                                                        | 0.23                     | 0.25                                           | 0.20                                           |
| D             |                                                                        | 0.37                     | 0.12                                           | 0.60                                           |
|               |                                                                        | 0.23                     | 0.69                                           | 0.54                                           |
| SM 34         | near shore, Figure 2                                                   | 2.67                     | 1.05                                           | 0.42                                           |
|               |                                                                        | 0.50                     | 0.11                                           | 0.24                                           |
| F             | near A-2, Site A                                                       | 2.33                     | 0.06                                           | 0.046                                          |
| G             | near A-1, Site A                                                       | 2.5                      | 0.09                                           | 0.065                                          |
| I             | also near A-1, Site A                                                  | 2.5                      | 0.02                                           | 0.14                                           |
| J             | between A1 and A3, see Figure 3                                        | 2.1                      | 0.22                                           | 0.188                                          |



## **APPENDIX 8**

### **Geologic Data Base**

Appendix 8: Geology Data Base -West Site

| Borehole ID. | Current Gd. Elevn | Top of Casing | Elevation of Screened Interval |                | Elevations of Bottom and Thicknesses of Geologic Units |                |            |                |            |                |            |
|--------------|-------------------|---------------|--------------------------------|----------------|--------------------------------------------------------|----------------|------------|----------------|------------|----------------|------------|
|              |                   |               | top of sand                    | bottom of sand | slag/fill                                              | slag thickness | silty sand | sand thickness | sand till  | till thickness | bedrock    |
| BEAK 1988    |                   |               |                                |                |                                                        |                |            |                |            |                |            |
| A1-1         | 192               | 193           | 178                            | 176            | 185                                                    | 7              | 182        | 3              | 175        | 7              | eoh        |
| A1-2         | 192               | 193           | 185                            | 183            | 185                                                    | 7              | eoh@183.00 |                |            |                |            |
| A2-1         | 193               | 194           | 180                            | 178            | 187                                                    | 6              | 182        | 5              | eoh@177.80 | >3.80          |            |
| A2-2         | 193               | 193           | 187                            | 185            | 187                                                    | 6              | eoh@185.30 |                |            |                |            |
| C1           | 193               | 194           | 186                            | 184            | 185                                                    | 8              | eoh@183.95 | >1.30          |            |                |            |
| C2-1         | 195               | 195           | 187                            | 186            | 189                                                    | 6              | 188        | 1              | 186        | 3              | eoh        |
| C2-2         | 195               | 195           | 191                            | 189            | eoh @189.15                                            |                |            |                |            |                |            |
| C3           | 196               | 197           | 191                            | 189            | 189                                                    | 7              | eoh@188.70 | >0.70          |            |                |            |
| C4           | 188               | 189           | 186                            | 184            | eoh @183.10                                            | >5.00          |            |                |            |                |            |
| D1-1         | 186               | 187           | 175                            | 172            | 180                                                    | 6              | 171        | 9              | eoh@169.60 | >1.15          |            |
| D1-2         | 186               | 187           | 184                            | 180            | eoh @179.95                                            |                |            |                |            |                |            |
| D2           | 186               | 187           | 183                            | 180            | eoh @179.20                                            | >6.40          |            |                |            |                |            |
| D3-1         | 185               | 186           | 166                            | 164            | 181                                                    | 4              | 176        | 5              | 165        | 11             | eoh        |
| D3-2         | 185               | 186           | 181                            | 180            | 181                                                    | 4              | eoh@179.65 |                |            |                |            |
| D4           | 185               | 186           | 183                            | 180            | 180                                                    | 5              | eoh@179.46 | >0.43          |            |                |            |
| D5-1         | 186               | 187           | 177                            | 176            | 186                                                    | 0              | 183        | 3              | eoh@176.30 | >6.50          |            |
| D5-2         | 186               | 187           | 183                            | 181            | 186                                                    | 0              | 183        | 3              | eoh@180.50 |                |            |
| D6           | 190               | 191           | 187                            | 185            | 188                                                    | 3              | ne         |                | 184        | 3              |            |
| GEOCON 1983  |                   |               |                                |                |                                                        |                |            |                |            |                |            |
| 1-A          | 185               | 187           | 178                            | 172            | ne                                                     |                | 184        | 1              | 178        | 6              | eoh@171.50 |
| 1-B          | 185               | 187           | 185                            | 180            | ne                                                     |                | 184        | 1              | eoh@180.20 |                |            |
| 2-A          | 184               | 186           | 175                            | 172            | ne                                                     |                | 183        | 1              | 178        | 5              | eoh@171.50 |
| 2-B          | 184               | 186           | 184                            | 179            | ne                                                     |                | 183        | 1              | eoh@178.90 |                |            |

Appendix 8: Geology Data Base -West Site

| Borehole ID. | Current Gd. Elevn | Top of Casing | Elevation of Screened Interval |                | Elevations of Bottom and Thicknesses of Geologic Units |                |            |                |            |                |            |
|--------------|-------------------|---------------|--------------------------------|----------------|--------------------------------------------------------|----------------|------------|----------------|------------|----------------|------------|
|              |                   |               | top of sand                    | bottom of sand | slag/fill                                              | slag thickness | silty sand | sand thickness | sand till  | till thickness | bedrock    |
| 3            | 186               | 187           | 185                            | 180            | 184                                                    | 3              | ne         |                | eoh@176.70 | >6.80          |            |
| 4-A          | 189               | 190           | 179                            | 178            | 186                                                    | 4              | 184        | 2              | 182        | 2              | eoh@176.10 |
| 4-B          | 189               | 190           | 189                            | 184            | 186                                                    | 4              | eoh@184.30 |                |            |                |            |
| 6            | 189               | 190           | 189                            | 184            | ne                                                     |                | 188        | 1              | 184        | 4              | eoh        |
| 7            | 189               | 190           | 188                            | 181            | ne                                                     |                | 185        | 4              | 181        | 4              | eoh        |
| 9-A          | 190               | 191           | 177                            | 175            | 188                                                    | 2              | ne         |                | 178        | 10             | eoh@175.10 |
| 9-B          | 190               | 191           | 190                            | 186            | 188                                                    | 2              | ne         |                | eoh@186.30 |                |            |
| 10           | 193               | 194           | 192                            | 184            | 187                                                    | 6              | 186        | 2              | eoh@183.10 | >2.60          |            |
| 11           | 204               | 205           | 203                            | 187            | 189                                                    | 15             | ne         |                | eoh@186.90 | >2.38          |            |

Thicknesses in metres, elevations in metres above mean sea level

ne = unit not encountered

eoh = end of borehole at contact between units

eoh@# = end of borehole within unit

## Appendix 8: Geology Data Base - East Site

| Borehole ID | Current Gd. Elevn | Top of Casing | Elevation of Screened Interval |                | Elevations of Bottoms and Thicknesses ofGeologic Units |                |              |                |              |                    |                     |                     |            |                 |         |
|-------------|-------------------|---------------|--------------------------------|----------------|--------------------------------------------------------|----------------|--------------|----------------|--------------|--------------------|---------------------|---------------------|------------|-----------------|---------|
|             |                   |               | top of sand                    | bottom of sand | slag/fill                                              | slag thickness | organic silt | silt thickness | shallow sand | sh. sand thickness | laminated clay/silt | clay/silt thickness | basal sand | basal thickness | bedrock |
| OW4B-88     | 185               | 186           | 183                            | 183            | 183                                                    | 2              | ne           |                | eoh@182.37   |                    |                     |                     |            |                 |         |
| OW5-88      | 185               | 185           | 182                            | 181            | 183                                                    | 2              | ne           |                | 181          | 2                  | eoh@178.73          |                     |            |                 |         |
| OW6-88      | 185               | 186           | 183                            | 182            | 183                                                    | 2              | ne           |                | 182          | 1                  | eoh@179.80          |                     |            |                 |         |
| OW7A-88     | 185               | 185           | 183                            | 182            | 183                                                    | 2              | 183          | 0              | 182          | 1                  | eoh@179.58          |                     |            |                 |         |
| OW7B-88     | 185               | 186           | 185                            | 183            | eoh@183.27                                             |                |              |                |              |                    |                     |                     |            |                 |         |
| OW8A-88     | 185               | 185           | 181                            | 180            | 183                                                    | 1              | 183          | 0              | 180          | 3                  | eoh@179.58          |                     |            |                 |         |
| OW8B-88     | 185               | 186           | 184                            | 183            | 183                                                    | 2              | 183          | 0              | eoh@182.64   |                    |                     |                     |            |                 |         |
| OW9A-88     | 185               | 185           | 181                            | 180            | 183                                                    | 2              | 183          | 0              | 180          | 3                  | eoh@178.03          |                     |            |                 |         |
| OW9B-88     | 185               | 185           | 184                            | 183            | 183                                                    | 2              | 183          | 0              | eoh@182.69   |                    |                     |                     |            |                 |         |
| OW10A-88    | 185               | 185           | 181                            | 180            | 183                                                    | 2              | 182          | 0              | 180          | 2                  | eoh@178.56          |                     |            |                 |         |
| OW10B-88    | 184               | 185           | 184                            | 183            | 183                                                    | 2              | eoh@182.62   |                |              |                    |                     |                     |            |                 |         |
| OW11A-88    | 185               | 186           | 182                            | 181            | 184                                                    | 2              | 183          | 0              | 180          | 3                  | eoh@179.84          |                     |            |                 |         |
| OW11B-88    | 185               | 186           | 184                            | 183            | 184                                                    | 2              | eoh@183.18   |                |              |                    |                     |                     |            |                 |         |
| OW12A-88    | 185               | 185           | 183                            | 180            | 183                                                    | 2              | 183          | 0              | 179          | 3                  | eoh@177.13          |                     |            |                 |         |
| OW12B-88    | 185               | 185           | 184                            | 183            | eoh@183.08                                             |                |              |                |              |                    |                     |                     |            |                 |         |
| OW13A-88    | 185               | 186           | 181                            | 180            | 183                                                    | 2              | 183          | 0              | 182          | 1                  | eoh@178.34          |                     |            |                 |         |
| OW13B-88    | 185               | 186           | 182                            | 182            | 183                                                    | 2              | 183          | 0              | 182          | 1                  | eoh@181.72          |                     |            |                 |         |

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1987

## Appendix 8: Geology Data Base - East Site

| Borehole ID | Current Gd. Elevn | Top of Casing         | Elevation of Screened Interval |                | Elevations of Bottoms and Thicknesses ofGeologic Units |                |              |                |              |                    |                     |                     |            |                 |            |  |
|-------------|-------------------|-----------------------|--------------------------------|----------------|--------------------------------------------------------|----------------|--------------|----------------|--------------|--------------------|---------------------|---------------------|------------|-----------------|------------|--|
|             |                   |                       | top of sand                    | bottom of sand | slag/fill                                              | slag thickness | organic silt | silt thickness | shallow sand | sh. sand thickness | laminated clay/silt | clay/silt thickness | basal sand | basal thickness | bedrock    |  |
| BEAK 1988   |                   |                       |                                |                |                                                        |                |              |                |              |                    |                     |                     |            |                 |            |  |
| A3          | 186               | 186                   | 183                            | 181            | 184                                                    | 2              | 181          | 3              | ne           |                    | eoh@180.65          | >3.20               |            |                 |            |  |
| A4-1        | 185               | 186                   | 172                            | 169            | 183                                                    | 2              | ne           |                | 181          | 3                  | 171                 | 10                  | 169        | 2               | eoh        |  |
| A4-2        | 185               | 186                   | 183                            | 181            | 183                                                    | 2              | ne           |                | eoh@181.15   | -                  |                     |                     |            |                 |            |  |
| A5          | 187               | 188                   | 185                            | 182            | 184                                                    | 3              | ne           |                | eoh@182.30   | >1.7               |                     |                     |            |                 |            |  |
| A6          | 187               | 188                   | 184                            | 183            | 185                                                    | 2              | ne           |                | eoh@182.50   | >2.2               |                     |                     |            |                 |            |  |
| A7-1        | 187               | 188                   | 142                            | 139            | 185                                                    | 2              | ne           |                | 178          | 7                  | 161                 | 17                  | 142        | 19              | eoh@139.00 |  |
| A7-2        | 187               | 188                   | 183                            | 177            | 185                                                    | 2              | ne           |                | 178          | 7                  | eoh@176.50          | >3.50               |            |                 |            |  |
| B1          | 184               | 185                   | 182                            | 179            | 183                                                    | 2              | 179          | 3              | eoh@179.05   | >3.60              |                     |                     |            |                 |            |  |
| B2-1        | 186               | 186                   | 167                            | 164            | 182                                                    | 3              | ne           |                | 180          | 2                  | 165                 | 15                  | eoh@162.40 | >2.50           |            |  |
| B2-2        | 186               | 186                   | 183                            | 181            | 182                                                    | 3              | ne           |                | eoh@180.90   | -                  |                     |                     |            |                 |            |  |
| B2-3        | 186               | -                     | 153                            | 150            | 182                                                    | 3              | ne           |                | 180          | 2                  | 165                 | 15                  | 154        | 11              | eoh@150.10 |  |
| B3          | 185               | 186                   | 182                            | 180            | 180                                                    | 5              | eoh@179.45   | >0.30          |              |                    |                     |                     |            |                 |            |  |
| B4-1        | 186               | 187                   | 165                            | 163            | 175                                                    | 11             | ne           |                | ne           |                    | 163                 | 12                  | eoh        |                 |            |  |
| B4-2        | 186               | 187                   | 184                            | 180            | eoh@180.15                                             | -              |              |                |              |                    |                     |                     |            |                 |            |  |
| B5          | 186               | 187                   | 184                            | 180            | eoh@180.05                                             | >5.70          |              |                |              |                    |                     |                     |            |                 |            |  |
| GEOCON      |                   |                       |                                |                |                                                        |                |              |                |              |                    |                     |                     |            |                 |            |  |
| 5-82        | 188               | 189                   | 188                            | 181            | 183                                                    | 6              | ne           |                | 181          | 2                  | eoh@178.80          | >2.46               |            |                 |            |  |
| 8-82        | 186               | 187                   | 182                            | 180            | 185                                                    | 1              | 183          | 2              | ne           |                    | eoh@178.90          | >4.30               |            |                 |            |  |
| 1B-80       | 185               | -                     | -                              | -              | 177                                                    | 8              | ne           |                | ne           |                    | 172                 | 5                   | 164        | 7               | eoh        |  |
| 2B-80       | 185               | -                     | -                              | -              | 177                                                    | 8              | ne           |                | ne           |                    | 173                 | 4                   | 164        | 9               | eoh        |  |
| 3B-80       | 185               | -                     | -                              | -              | 178                                                    | 7              | 175          | 3              | eoh@166.60   | >8.20              |                     |                     |            |                 |            |  |
| 4B-80       | 185               | -                     | -                              | -              | 176                                                    | 9              | ne           |                | ne           |                    | 172                 | 4                   | 164        | 7               | eoh        |  |
| 5B-80       | 186               | -                     | -                              | -              | 174                                                    | 11             | ne           |                | ne           |                    | 173                 | 1                   | 159        | 14              | eoh        |  |
| 6B(river)   | 183.37            | river bottom at 176.9 |                                |                | ne                                                     |                | 176          | ~0.60          | ne           |                    | 170                 | 6                   | eoh@161.20 | >9.00           |            |  |

Appendix 8: Geology Data Base - East Site

| Borehole ID | Current Gd. Elevn | Top of Casing | Elevation of Screened Interval |                | Elevations of Bottoms and Thicknesses of Geologic Units |                |              |                |              |                    |                     |                     |            |                 |         |
|-------------|-------------------|---------------|--------------------------------|----------------|---------------------------------------------------------|----------------|--------------|----------------|--------------|--------------------|---------------------|---------------------|------------|-----------------|---------|
|             |                   |               | top of sand                    | bottom of sand | slag/fill                                               | slag thickness | organic silt | silt thickness | shallow sand | sh. sand thickness | laminated clay/silt | clay/silt thickness | basal sand | basal thickness | bedrock |
| 1-I         | 186               | 187           | 179                            | 177            | 184                                                     | 2              | ne           |                | 181          | 2                  | eoh@176.05          |                     |            |                 |         |
| 1-II        | 186               | 187           | 183                            | 181            | 183                                                     | 2              | ne           |                | eoh@181.28   |                    |                     |                     |            |                 |         |
| 1-III       | 185               | 186           | 185                            | 183            | eoh@183.36                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 2-I         | 185               | 186           | 182                            | 181            | 183                                                     | 2              | 183          | 0              | 181          | 2                  | eoh@180.31          |                     |            |                 |         |
| 2-II        | 185               | 186           | 184                            | 183            | eoh@182.43                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 3-I         | 185               | 185           | 182                            | 181            | 182                                                     | 2              | 182          | 0              | 181          | 2                  | eoh@180.23          |                     |            |                 |         |
| 3-II        | 185               | 185           | 184                            | 183            | eoh@182.87                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 4-I         | 185               | 185           | 183                            | 180            | 183                                                     | 2              | 183          | 0              | 180          | 3                  | eoh@179.93          |                     |            |                 |         |
| 4-II        | 185               | 186           | 185                            | 183            | eoh@182.96                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 5-I         | 185               | 186           | 181                            | 180            | 182                                                     | 2              | 182          | 1              | 180          | 2                  | eoh@179.12          |                     |            |                 |         |
| 5-II        | 185               | 185           | 184                            | 183            | eoh@182.51                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 6-I         | 185               | 186           | 178                            | 176            | 183                                                     | 2              | 182          | 1              | 179          | 2                  | eoh@175.37          |                     |            |                 |         |
| 6-II        | 185               | 186           | 182                            | 179            | 183                                                     | 2              | 182          | 1              | 179          | 2                  | eoh                 |                     |            |                 |         |
| 6-III       | destroyed         |               |                                |                |                                                         |                |              |                |              |                    |                     |                     |            |                 |         |
| 7-I         | 185               | 186           | 181                            | 179            | 183                                                     | 2              | 181          | 2              | 179          | 2                  | eoh@178.74          |                     |            |                 |         |
| 7-II        | 185               | 186           | 185                            | 183            | eoh@182.99                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 8-I         | 185               | 186           | 182                            | 180            | 183                                                     | 2              | 183          | 1              | 180          | 3                  | eoh@179.6           |                     |            |                 |         |
| 8-II        | 185               | 186           | 185                            | 183            | eoh@183.19                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 9-I         | 185               | 186           | 179                            | 176            | 183                                                     | 2              | 182          | 1              | 181          | 1                  | eoh@175.55          |                     |            |                 |         |
| 9-II        | 185               | 186           | 182                            | 181            | 183                                                     | 2              | 182          | 1              | 181          | 1                  | eoh                 |                     |            |                 |         |
| 9-III       | 185               | 186           | 185                            | 183            | 183                                                     | 2              | eoh          |                |              |                    |                     |                     |            |                 |         |
| 10-I        | 185               | 186           | 182                            | 180            | 183                                                     | 2              | 183          | 0              | 181          | 3                  | eoh@179.93          |                     |            |                 |         |
| 10-II       | 185               | 186           | 185                            | 183            | eoh@183.32                                              |                |              |                |              |                    |                     |                     |            |                 |         |
| 11-I        | 185               | 186           | 178                            | 176            | 184                                                     | 1              | 183          | 0              | 181          | 3                  | eoh@175.39          |                     |            |                 |         |
| 11-II       | 185               | 186           | 182                            | 180            | 184                                                     | 1              | 183          | 0              | 180          | 3                  | eoh                 |                     |            |                 |         |
| 11-III      | 185               | 186           | 185                            | 183            | 184                                                     | 1              | 183          | 0              | 183          | 1                  | eoh                 |                     |            |                 |         |

Appendix 8: Geology Data Base - East Site

| Borehole ID       | Current Gd. Elevn | Top of Casing | Elevation of Screened Interval |                | Elevations of Bottoms and Thicknesses of Geologic Units |                |              |                |              |                    |                     |                     |            |                 |            |
|-------------------|-------------------|---------------|--------------------------------|----------------|---------------------------------------------------------|----------------|--------------|----------------|--------------|--------------------|---------------------|---------------------|------------|-----------------|------------|
|                   |                   |               | top of sand                    | bottom of sand | slag/fill                                               | slag thickness | organic silt | silt thickness | shallow sand | sh. sand thickness | laminated clay/silt | clay/silt thickness | basal sand | basal thickness | bedrock    |
| DOMTAR 1952       |                   |               |                                |                |                                                         |                |              |                |              |                    |                     |                     |            |                 |            |
| DOM-1             | 185               | -             | -                              | -              | 180                                                     | 5              | ne           |                | 178          | 2                  | 158                 | 20                  | 149        | 9               | eoh@123.91 |
| COOPER CRANE 1974 |                   |               |                                |                |                                                         |                |              |                |              |                    |                     |                     |            |                 |            |
| CC-1              | 186               | -             | 157                            | 155            | -                                                       |                | -            |                | 177          | 9                  | 158                 | 18                  | eoh@153.60 |                 |            |

ne = unit not encountered

coh = end of borehole at contact between units

coh@# = end of borehole within unit

eop = end of penetration test, at contact

eop@# = end of penetration test within unit

## **APPENDIX 9**

### **Groundwater Flux Calculations**



## **VOLUMETRIC FLUX CALCULATIONS**

**$Q=KiA$       where  $A=bL$**

| Element No. | Discharge to            | Discharge through | Average Hydraulic Cond., K (m/s) | Average Hydraulic Grad., i (-) | Area, A         |              | Flux, Q  |         |
|-------------|-------------------------|-------------------|----------------------------------|--------------------------------|-----------------|--------------|----------|---------|
|             |                         |                   |                                  |                                | Thickness b (m) | Length L (m) | (m3/s)   | (m3/yr) |
| A           | St. Marys River         | slag              | 5.2E-05                          | 0.0089                         | 2.45            | 2765         | 3.1E-03  | 9.9E+04 |
| B           | West Davignon Diversion | till              | 6.8E-07                          | 0.0083                         | 1.12            | 1300         | 8.2E-06  | 2.6E+02 |
| C           | Baseline Road ditch     | slag              | 5.2E-05                          | 0.013                          | 1.7             | 1000         | 1.1E-03  | 3.6E+04 |
| C           | Baseline Road ditch     | sand              | 8.7E-05                          | 0.013                          | 2.7             | 1000         | 3.1E-03  | 9.6E+04 |
| C           | Baseline Road ditch     | TOTAL             |                                  |                                |                 |              | 4.2E-03  | 1.3E+05 |
| C           | St. Marys River         | slag              | 5.2E-05                          | 0.013                          | 2.66            | 708          | 1.3E-03  | 4.0E+04 |
| C           | St. Marys River         | sand              | 8.7E-05                          | 0.013                          | 2               | 708          | 1.6E-03  | 5.1E+04 |
| C           | St. Marys River         | TOTAL             |                                  |                                |                 |              | 2.9E-03  | 9.1E+04 |
| D           | Bennett Creek           | slag              | 5.2E-05                          | 0.0041                         | 1.13            | 917          | 2.2E-04  | 7.0E+03 |
| D           | Bennett Creek           | sand              | 8.7E-05                          | 0.0041                         | 3               | 917          | 9.8E-04  | 3.1E+04 |
| D           | Bennett Creek           | TOTAL             |                                  |                                |                 |              | 1.2E-03  | 3.8E+04 |
| D           | Baseline Road ditch     | slag              | 5.2E-05                          | 0.0041                         | 0.67            | 1417         | 2.0E-04  | 6.4E+03 |
| D           | Baseline Road ditch     | sand              | 8.7E-05                          | 0.0041                         | 2               | 1417         | 1.0E-03  | 3.2E+04 |
| D           | Baseline Road ditch     | TOTAL             |                                  |                                |                 |              | 1.2E-03  | 3.8E+04 |
| E           | St. Marys River         | slag              | 5.2E-05                          | 0.0041                         | 1.38            | 958          | 2.8E-04  | 8.9E+03 |
| E           | St. Marys River         | sand              | 8.7E-05                          | 0.0041                         | 2.1             | 958          | 7.2E-04  | 2.3E+04 |
| E           | St. Marys River         | TOTAL             |                                  |                                |                 |              | 1.00E-03 | 3.2E+04 |
| F           | Spring Creek            | slag              | 5.2E-05                          | 0.0041                         | 0.67            | 800          | 1.1E-04  | 3.6E+03 |
| F           | Spring Creek            | sand              | 8.7E-05                          | 0.0041                         | 3.6             | 800          | 1.0E-03  | 3.2E+04 |
| F           | Spring Creek            | TOTAL             |                                  |                                |                 |              | 1.1E-03  | 3.6E+04 |
|             |                         |                   |                                  |                                |                 | Total        | 1.5E-02  | 4.7E+05 |

## Appendix 9: Groundwater Volumetric Flux Calculations - Algoma 1988, 1989

### Minimum Flux

| Element No. | Discharge to            | Discharge through | Average Hydraulic Cond., K (m/s) | Average Hydraulic Grad., i (-) | Area, A         |              | Flux, Q |         |
|-------------|-------------------------|-------------------|----------------------------------|--------------------------------|-----------------|--------------|---------|---------|
|             |                         |                   |                                  |                                | Thickness b (m) | Length L (m) | (m3/s)  | (m3/yr) |
| A           | St. Marys River         | slag              | 9.4E-06                          | 0.0072                         | 2.26            | 2765         | 4.2E-04 | 1.3E+04 |
| B           | West Davignon Diversion | till              | 9.8E-08                          | 0.0066                         | 0.53            | 1300         | 4.5E-07 | 1.4E+01 |
| C           | Baseline Road ditch     | slag              | 9.4E-06                          | 0.0099                         | 1.32            | 1000         | 1.2E-04 | 3.9E+03 |
| C           | Baseline Road ditch     | sand              | 4.6E-08                          | 0.0099                         | 2.7             | 1000         | 1.2E-06 | 3.9E+01 |
| C           | Baseline Road ditch     | TOTAL             |                                  |                                |                 |              | 1.2E-04 | 3.9E+03 |
| C           | St. Marys River         | slag              | 9.4E-06                          | 0.0099                         | 2.34            | 708          | 1.5E-04 | 4.9E+03 |
| C           | St. Marys River         | sand              | 4.6E-08                          | 0.0099                         | 2               | 708          | 6.4E-07 | 2.0E+01 |
| C           | St. Marys River         | TOTAL             |                                  |                                |                 |              | 1.5E-04 | 4.9E+03 |
| D           | Bennett Creek           | slag              | 9.4E-06                          | 0.0034                         | 0.87            | 917          | 2.5E-05 | 8.0E+02 |
| D           | Bennett Creek           | sand              | 4.6E-08                          | 0.0034                         | 3               | 917          | 4.3E-07 | 1.4E+01 |
| D           | Bennett Creek           | TOTAL             |                                  |                                |                 |              | 2.6E-05 | 8.2E+02 |
| D           | Baseline Road ditch     | slag              | 9.4E-06                          | 0.0034                         | 0.67            | 1417         | 3.0E-05 | 9.6E+02 |
| D           | Baseline Road ditch     | sand              | 4.6E-08                          | 0.0034                         | 2               | 1417         | 4.4E-07 | 1.4E+01 |
| D           | Baseline Road ditch     | TOTAL             |                                  |                                |                 |              | 3.1E-05 | 9.7E+02 |
| E           | St. Marys River         | slag              | 9.4E-06                          | 0.0034                         | 0.99            | 958          | 3.0E-05 | 9.6E+02 |
| E           | St. Marys River         | sand              | 4.6E-08                          | 0.0034                         | 2.1             | 958          | 3.1E-07 | 9.9E+00 |
| E           | St. Marys River         | TOTAL             |                                  |                                |                 |              | 3.1E-05 | 9.7E+02 |
| F           | Spring Creek            | slag              | 9.4E-06                          | 0.0034                         | 0.42            | 800          | 1.1E-05 | 3.4E+02 |
| F           | Spring Creek            | sand              | 4.6E-08                          | 0.0034                         | 3.6             | 800          | 4.5E-07 | 1.4E+01 |
| F           | Spring Creek            | TOTAL             |                                  |                                |                 |              | 1.1E-05 | 3.5E+02 |
|             |                         |                   |                                  |                                |                 | Total        | 8.0E-04 | 2.5E+04 |

## Appendix 9: Groundwater Volumetric Flux Calculations - Algoma 1988, 1989

### Maximum Flux

| Element No. | Discharge to            | Discharge through | Average Hydraulic Cond., K (m/s) | Average Hydraulic Grad., i (-) | Area, A         |              | Flux, Q |         |
|-------------|-------------------------|-------------------|----------------------------------|--------------------------------|-----------------|--------------|---------|---------|
|             |                         |                   |                                  |                                | Thickness b (m) | Length L (m) | (m3/s)  | (m3/yr) |
| A           | St. Marys River         | slag              | 2.2E-04                          | 0.01                           | 2.75            | 2765         | 1.7E-02 | 5.3E+05 |
| B           | West Davignon Diversion | till              | 1.0E-05                          | 0.0096                         | 2.07            | 1300         | 2.6E-04 | 8.1E+03 |
| C           | Baseline Road ditch     | slag              | 2.2E-04                          | 0.014                          | 1.93            | 1000         | 5.9E-03 | 1.9E+05 |
| C           | Baseline Road ditch     | sand              | 6.4E-04                          | 0.014                          | 2.7             | 1000         | 2.4E-02 | 7.6E+05 |
| C           | Baseline Road ditch     | TOTAL             |                                  |                                |                 |              | 3.0E-02 | 9.5E+05 |
| C           | St. Marys River         | slag              | 2.2E-04                          | 0.014                          | 3.38            | 708          | 7.4E-03 | 2.3E+05 |
| C           | St. Marys River         | sand              | 6.4E-04                          | 0.014                          | 2               | 708          | 1.3E-02 | 4.0E+05 |
| C           | St. Marys River         | TOTAL             |                                  |                                |                 |              | 2.0E-02 | 6.3E+05 |
| D           | Bennett Creek           | slag              | 2.2E-04                          | 0.0056                         | 1.48            | 917          | 1.7E-03 | 5.3E+04 |
| D           | Bennett Creek           | sand              | 6.4E-04                          | 0.0056                         | 3               | 917          | 9.9E-03 | 3.1E+05 |
| D           | Bennett Creek           | TOTAL             |                                  |                                |                 |              | 1.2E-02 | 3.6E+05 |
| D           | Baseline Road ditch     | slag              | 2.2E-04                          | 0.0056                         | 0.85            | 1417         | 1.5E-03 | 4.7E+04 |
| D           | Baseline Road ditch     | sand              | 6.4E-04                          | 0.0056                         | 2               | 1417         | 1.0E-02 | 3.2E+05 |
| D           | Baseline Road ditch     | TOTAL             |                                  |                                |                 |              | 1.2E-02 | 3.7E+05 |
| E           | St. Marys River         | slag              | 2.2E-04                          | 0.0056                         | 1.695           | 958          | 2.0E-03 | 6.3E+04 |
| E           | St. Marys River         | sand              | 6.4E-04                          | 0.0056                         | 2.1             | 958          | 7.2E-03 | 2.3E+05 |
| E           | St. Marys River         | TOTAL             |                                  |                                |                 |              | 9.2E-03 | 2.9E+05 |
| F           | Spring Creek            | slag              | 2.2E-04                          | 0.0056                         | 0.96            | 800          | 9.5E-04 | 3.0E+04 |
| F           | Spring Creek            | sand              | 6.4E-04                          | 0.0056                         | 3.6             | 800          | 1.0E-02 | 3.3E+05 |
| F           | Spring Creek            | TOTAL             |                                  |                                |                 |              | 1.1E-02 | 3.6E+05 |
|             |                         |                   |                                  |                                |                 | Total        | 1.1E-01 | 3.5E+06 |

## APPENDIX 9

### GROUNDWATER FLUX CALCULATIONS - RECHARGE

$$R = rA$$

where:  $R$  = recharge volume

$r$  = infiltration rate

$A$  = surface area

$$r = 0.4 \text{ m}$$

| No.   | I     | Lb<br>(m <sup>2</sup> ) | Q<br>(m <sup>3</sup> /y) | A<br>(m <sup>2</sup> ) | R<br>(m <sup>3</sup> /y) |
|-------|-------|-------------------------|--------------------------|------------------------|--------------------------|
| A     | 0.008 | 5,529                   | 697,450                  | 1,216,425              | 4.9x10 <sup>5</sup>      |
| B     | 0.005 | 2,600                   | 204,984                  | 469,000                | 1.9x10 <sup>5</sup>      |
| C     | 0.008 | 3,630                   | 457,902                  | 1,114,574              | 4.4x10 <sup>5</sup>      |
| D     | 0.003 | 5,362                   | 253,691                  | 998,250                | 4.0x10 <sup>5</sup>      |
| E     | 0.002 | 2,580                   | 81,363                   | 380,545                | 1.5x10 <sup>5</sup>      |
| Total |       |                         | 1,695,390                |                        | 1.6x10 <sup>6</sup>      |

**MASS FLUX CALCULATIONS**

## DETAILED CALCULATION OF MASS FLUXES

| Area No.                       | Weighted Average Concentration Formula        |
|--------------------------------|-----------------------------------------------|
| <b>St. Marys River</b>         |                                               |
| A                              | $1/4 D1 + 1/4 D2 + 1/5 D3 + 1/5 D4 + 1/10 D5$ |
| C                              | $2/7 B5 + 2/7 B4 + 2/7 B3 + 1/7 B2$           |
| E                              | $2/7 B5 + 2/7 B4 + 2/7 B3 + 1/7 B2$           |
| <b>West Davignon Diversion</b> |                                               |
| B                              | $3/4 D6 + 1/4 D5$                             |
| <b>Baseline Road Ditch</b>     |                                               |
| B                              | A3                                            |
| C                              | $1/2 A3 + 1/2 A4$                             |
| D                              | A5                                            |
| <b>Bennett Creek</b>           |                                               |
| D                              | $3/4 A6 + 1/4 A7$                             |
| <b>Spring Creek</b>            |                                               |
| F                              | B1                                            |

## Appendix 9: Mass Flux Estimations - Anions and Organics

Weighted Average Concentration Calculations - see Table 9.1 for Formulae

| Element No.<br>Discharge To | A<br>SMR | C<br>SMR | E<br>SMR | B<br>WDD  | B<br>BRD | C<br>BRD | D<br>BRD | D<br>BC  | F<br>SC   |
|-----------------------------|----------|----------|----------|-----------|----------|----------|----------|----------|-----------|
| DIC                         | 0.7800   | 5.3300   | 5.3300   | 0.0000    | -        | 0.0000   | 11.0000  | 0.0000   | 33.0000   |
| ALKALINITY                  | 318.2500 | 424.5667 | 424.5667 | 542.5000  | 87.0000  | 90.2500  | 302.2500 | 138.0417 | 123.0000  |
| SULPHIDE                    | 0.7233   | 0.0000   | 0.0000   | 0.0000    | -        | 0.0000   | 0.0500   | 0.0000   | 0.0000    |
| TOTAL CYANIDE               | 0.3938   | 0.0335   | 0.0335   | 0.1158    | -        | 0.0000   | 0.0077   | 0.0000   | 0.0010    |
| BROMIDE                     | 0.0000   | 0.1860   | 0.1860   | 0.0000    | 0.0000   | 0.0400   | 0.0600   | 0.0319   | 0.0167    |
| CHLORIDE                    | 65.9642  | 124.6873 | 124.6873 | 130.9063  | 1.2075   | 14.5204  | 17.1250  | 8.7106   | 13.9333   |
| FLUORIDE                    | 0.8515   | 0.6876   | 0.6876   | 1.6313    | 0.1650   | 0.2092   | 0.5625   | 0.2169   | 0.1100    |
| SULPHATE                    | 702.9167 | 71.7923  | 71.7923  | 1080.5625 | 2.3000   | 53.3167  | 9.1250   | 11.1219  | 29.5667   |
| NITRATE-N                   | 0.0333   | 0.0363   | 0.0363   | 0.0313    | 0.0000   | 0.0200   | 0.0700   | 0.0244   | 1.2333    |
| AMMONIA-N                   | 0.8267   | 0.0000   | 0.0000   | 0.0000    | -        | 0.0000   | -        | 0.0000   | 1.3450    |
| TOTAL KJELDAHL NITROGEN     | 4.9702   | 2.8480   | 2.8480   | 8.8750    | -        | 0.1950   | 17.1500  | 0.4525   | 1.8000    |
| TOTAL PHOSPHOROUS           | 0.1572   | 0.1677   | 0.1677   | 0.3508    | -        | 0.0000   | 0.1030   | 0.0330   | 0.0500    |
| DOC                         | 8.9021   | 3.8985   | 3.8985   | 26.5000   | 1.7500   | 3.8083   | 37.5000  | 4.8833   | 13.9000   |
| PHENOLS                     | 0.0180   | 0.0056   | 0.0056   | 0.0042    | 0.0000   | 0.0005   | 0.1333   | 0.0017   | 0.0648    |
| PCB (ug/L)                  | 0.0000   | 0.0000   | 0.0000   | 0.0000    | -        | 0.0000   | -        | 0.0000   | 0.0000    |
| OIL AND GREASE              | 3.0000   | 1.1600   | 1.1600   | 6.5000    | 0.0000   | 0.0000   | -        | 2.2500   | -         |
| BTX (ug/L)                  |          |          |          |           |          |          |          |          |           |
| BENZENE                     | 6.6833   | 5.5100   | 5.5100   | 47.2500   | -        | 0.0000   | 0.0000   | 0.0000   | 3.4500    |
| TOLUENE                     | 6.1500   | 11.7450  | 11.7450  | 2.2500    | -        | 0.0000   | 0.0000   | 7.0000   | 0.5190    |
| XYLENE                      | 4.7500   | 0.0000   | 0.0000   | 0.0000    | -        | 0.0000   | 0.0000   | 24.5000  | 0.3490    |
| TOTAL BTX                   | 17.5833  | 23.2000  | 23.2000  | 49.5000   | -        | 0.0000   | 0.0000   | 31.5000  | 4318.0000 |
| PAHs (ug/L)                 |          |          |          |           |          |          |          |          |           |
| NAPHTHALENE                 | 8.0717   | 0.7790   | 0.7790   | 0.3625    | -        | 0.0000   | 7.4667   | 0.8625   | 474.0000  |
| ACENAPHTHYLENE              | 0.3662   | 0.1190   | 0.1190   | 0.0000    | -        | 0.0000   | 0.0167   | 0.0000   | 176.0000  |
| ACENAPHTHENE                | 0.9784   | 1.2751   | 1.2751   | 0.3500    | -        | 0.0000   | 0.1833   | 0.0000   | 1115.0000 |
| FLUORENE                    | 0.6438   | 0.8258   | 0.8258   | 0.2125    | -        | 0.0000   | 0.1000   | 0.0000   | 915.0000  |
| PHENANTHRENE                | 1.4862   | 2.4386   | 2.4386   | 0.3125    | -        | 0.0000   | 3.0867   | 0.6750   | 77.5000   |
| ANTHRACENE                  | 0.3689   | 0.3867   | 0.3867   | 0.0500    | -        | 0.0000   | 0.1100   | 0.0000   | 319.5000  |
| FLUORANTHENE                | 0.9652   | 2.3942   | 2.3942   | 0.0500    | -        | 0.0000   | 0.7700   | 0.7500   | 56.4000   |
| PYRENE                      | 0.8607   | 2.1477   | 2.1477   | 0.0250    | -        | 0.0000   | 0.4900   | 0.3750   | 601.0000  |
| BENZO(a)ANTHRACENE          | 0.0965   | 0.2039   | 0.2039   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 367.0000  |
| CHRYSENE                    | 0.1503   | 0.2768   | 0.2768   | 0.0000    | -        | 0.0000   | 0.0333   | 0.2250   | 285.0000  |
| BENZO(b)FLUORANTHENE        | 0.1475   | 0.1353   | 0.1353   | 0.0000    | -        | 0.0000   | 0.0000   | 0.2625   | 246.5000  |
| BENZO(k)FLUORANTHENE        | 0.0100   | 0.0870   | 0.0870   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 134.0000  |
| BENZO(a)PYRENE              | 0.1367   | 0.1547   | 0.1547   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 226.0000  |
| PERYLENE                    | 0.0000   | 0.0290   | 0.0290   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 76.5000   |
| INDENO(1,2,3-c,d)PYRENE     | 0.0125   | 0.0580   | 0.0580   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 123.0000  |
| DIBENZO(a,h)ANTHRACENE      | 0.0000   | 0.0000   | 0.0000   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 31.0000   |
| BENZO(g,h,i)PERYLENE        | 0.0000   | 0.0483   | 0.0483   | 0.0000    | -        | 0.0000   | 0.0000   | 0.0000   | 72.0000   |
| TOTAL PAHs                  | 14.2694  | 11.3591  | 11.3591  | 1.3625    | -        | 0.0000   | 12.2567  | 1.5750   | 5295.4000 |

\* SMR = St. Marys River  
WDD = West Davignon Diversion  
Concentrations in mg/L unless otherwise specified

BRD = Baseline Road Ditch  
BC = Bennett Creek

SC = Spring Creek



## Appendix 9: Mass Flux Estimations - Anions and Organics

### CHLORIDE

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 1.3E+05        | 14.5204             | 1.9E+03           | 5.2E+00            |
| D           | Baseline Road ditch     | 3.8E+04        | 17.1250             | 6.5E+02           | 1.8E+00            |
|             | TOTAL                   |                |                     | 2.5E+03           | 7.0E+00            |
| D           | Bennett Creek           | 3.8E+04        | 8.7106              | 3.3E+02           | 9.1E-01            |
| C           | St. Marys River         | 9.1E+04        | 124.6873            | 1.1E+04           | 3.1E+01            |
| A           | St. Marys River         | 9.9E+04        | 65.9642             | 6.5E+03           | 1.8E+01            |
| E           | St. Marys River         | 3.2E+04        | 124.6873            | 4.0E+03           | 1.1E+01            |
|             | TOTAL                   |                |                     | 2.2E+04           | 6.0E+01            |
| B           | West Davignon Diversion | 2.6E+02        | 130.9063            | 3.4E+01           | 9.3E-02            |
| F           | Spring Creek            | 3.6E+04        | 13.9333             | 5.0E+02           | 1.4E+00            |
|             | Total                   |                |                     | 2.5E+04           | 6.9E+01            |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 3.9E+03        | 14.5204             | 5.7E+01           | 1.6E-01            |
| D           | Baseline Road ditch     | 9.7E+02        | 17.1250             | 1.7E+01           | 4.6E-02            |
|             | TOTAL                   |                |                     | 7.3E+01           | 2.0E-01            |
| D           | Bennett Creek           | 8.2E+02        | 8.7106              | 7.1E+00           | 2.0E-02            |
| C           | St. Marys River         | 4.9E+03        | 124.6873            | 6.1E+02           | 1.7E+00            |
| A           | St. Marys River         | 1.3E+04        | 65.9642             | 8.8E+02           | 2.4E+00            |
| E           | St. Marys River         | 9.7E+02        | 124.6873            | 1.2E+02           | 3.3E-01            |
|             | TOTAL                   |                |                     | 1.6E+03           | 4.4E+00            |
| B           | West Davignon Diversion | 1.4E+01        | 130.9063            | 1.8E+00           | 5.0E-03            |
| F           | Spring Creek            | 3.5E+02        | 13.9333             | 4.9E+00           | 1.3E-02            |
|             | Total                   |                |                     | 1.7E+03           | 4.6E+00            |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 9.5E+05        | 14.5204             | 1.4E+04           | 3.8E+01            |
| D           | Baseline Road ditch     | 3.7E+05        | 17.1250             | 6.3E+03           | 1.7E+01            |
|             | TOTAL                   |                |                     | 2.0E+04           | 5.5E+01            |
| D           | Bennett Creek           | 3.6E+05        | 8.7106              | 3.1E+03           | 8.6E+00            |
| C           | St. Marys River         | 6.3E+05        | 124.6873            | 7.9E+04           | 2.2E+02            |
| A           | St. Marys River         | 5.3E+05        | 65.9642             | 3.5E+04           | 9.5E+01            |
| E           | St. Marys River         | 2.9E+05        | 124.6873            | 3.6E+04           | 9.9E+01            |
|             | TOTAL                   |                |                     | 1.5E+05           | 4.1E+02            |
| B           | West Davignon Diversion | 8.1E+03        | 130.9063            | 1.1E+03           | 2.9E+00            |
| F           | Spring Creek            | 3.6E+05        | 13.9333             | 5.0E+03           | 1.4E+01            |
|             | Total                   |                |                     | 1.8E+05           | 4.9E+02            |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### TOTAL CYANIDE

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0077              | 2.9E-01           | 8.0E-04            |         |
|             | TOTAL                   |                |                     | 2.9E-01           |                    | 8.0E-04 |
| D           | Bennett Creek           | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| C           | St. Marys River         | 9.1E+04        | 0.0335              | 3.1E+00           | 8.4E-03            |         |
| A           | St. Marys River         | 9.9E+04        | 0.3938              | 3.9E+01           | 1.1E-01            |         |
| E           | St. Marys River         | 3.2E+04        | 0.0335              | 1.1E+00           | 2.9E-03            |         |
|             | TOTAL                   |                |                     | 4.3E+01           |                    | 1.2E-01 |
| B           | West Davignon Diversion | 2.6E+02        | 0.1158              | 3.0E-02           | 8.2E-05            |         |
| F           | Spring Creek            | 3.6E+04        | 0.0010              | 3.6E-02           | 9.9E-05            |         |
|             | Total                   |                |                     | 4.3E+01           | 1.2E-01            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0077              | 7.4E-03           | 2.0E-05            |         |
|             | TOTAL                   |                |                     | 7.4E-03           |                    | 2.0E-05 |
| D           | Bennett Creek           | 8.2E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| C           | St. Marys River         | 4.9E+03        | 0.0335              | 1.6E-01           | 4.5E-04            |         |
| A           | St. Marys River         | 1.3E+04        | 0.3938              | 5.3E+00           | 1.4E-02            |         |
| E           | St. Marys River         | 9.7E+02        | 0.0335              | 3.2E-02           | 8.9E-05            |         |
|             | TOTAL                   |                |                     | 5.4E+00           |                    | 1.5E-02 |
| B           | West Davignon Diversion | 1.4E+01        | 0.1158              | 1.6E-03           | 4.5E-06            |         |
| F           | Spring Creek            | 3.5E+02        | 0.0010              | 3.5E-04           | 9.6E-07            |         |
|             | Total                   |                |                     | 5.5E+00           | 1.5E-02            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0077              | 2.8E+00           | 7.8E-03            |         |
|             | TOTAL                   |                |                     | 2.8E+00           |                    | 7.8E-03 |
| D           | Bennett Creek           | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| C           | St. Marys River         | 6.3E+05        | 0.0335              | 2.1E+01           | 5.8E-02            |         |
| A           | St. Marys River         | 5.3E+05        | 0.3938              | 2.1E+02           | 5.7E-01            |         |
| E           | St. Marys River         | 2.9E+05        | 0.0335              | 9.7E+00           | 2.7E-02            |         |
|             | TOTAL                   |                |                     | 2.4E+02           |                    | 6.5E-01 |
| B           | West Davignon Diversion | 8.1E+03        | 0.1158              | 9.4E-01           | 2.6E-03            |         |
| F           | Spring Creek            | 3.6E+05        | 0.0010              | 3.6E-01           | 9.9E-04            |         |
|             | Total                   |                |                     | 2.4E+02           | 6.7E-01            |         |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### FLUORIDE

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.2092              | 2.7E+01           | 7.4E-02            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.5625              | 2.1E+01           | 5.9E-02            |         |
|             | TOTAL                   |                |                     | 4.9E+01           |                    | 1.3E-01 |
| D           | Bennett Creek           | 3.8E+04        | 0.2169              | 8.2E+00           | 2.3E-02            |         |
| C           | St. Marys River         | 9.1E+04        | 0.6876              | 6.3E+01           | 1.7E-01            |         |
| A           | St. Marys River         | 9.9E+04        | 0.8515              | 8.4E+01           | 2.3E-01            |         |
| E           | St. Marys River         | 3.2E+04        | 0.6876              | 2.2E+01           | 6.0E-02            |         |
|             | TOTAL                   |                |                     | 1.8E+02           |                    | 4.6E-01 |
| B           | West Davignon Diversion | 2.6E+02        | 1.6313              | 4.2E-01           | 1.2E-03            |         |
| F           | Spring Creek            | 3.6E+04        | 0.1100              | 4.0E+00           | 1.1E-02            |         |
|             | Total                   |                |                     | 2.3E+02           | 6.3E-01            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.2092              | 8.2E-01           | 2.2E-03            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.5625              | 5.5E-01           | 1.5E-03            |         |
|             | TOTAL                   |                |                     | 1.4E+00           |                    | 3.7E-03 |
| D           | Bennett Creek           | 8.2E+02        | 0.2169              | 1.8E-01           | 4.9E-04            |         |
| C           | St. Marys River         | 4.9E+03        | 0.6876              | 3.4E+00           | 9.2E-03            |         |
| A           | St. Marys River         | 1.3E+04        | 0.8515              | 1.1E+01           | 3.1E-02            |         |
| E           | St. Marys River         | 9.7E+02        | 0.6876              | 6.6E-01           | 1.8E-03            |         |
|             | TOTAL                   |                |                     | 1.6E+01           |                    | 4.2E-02 |
| B           | West Davignon Diversion | 1.4E+01        | 1.6313              | 2.3E-02           | 6.3E-05            |         |
| F           | Spring Creek            | 3.5E+02        | 0.1100              | 3.9E-02           | 1.1E-04            |         |
|             | Total                   |                |                     | 1.7E+01           | 4.7E-02            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.2092              | 2.0E+02           | 5.4E-01            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.5625              | 2.1E+02           | 5.7E-01            |         |
|             | TOTAL                   |                |                     | 4.1E+02           |                    | 1.1E+00 |
| D           | Bennett Creek           | 3.6E+05        | 0.2169              | 7.8E+01           | 2.1E-01            |         |
| C           | St. Marys River         | 6.3E+05        | 0.6876              | 4.3E+02           | 1.2E+00            |         |
| A           | St. Marys River         | 5.3E+05        | 0.8515              | 4.5E+02           | 1.2E+00            |         |
| E           | St. Marys River         | 2.9E+05        | 0.6876              | 2.0E+02           | 5.5E-01            |         |
|             | TOTAL                   |                |                     | 1.2E+03           |                    | 3.0E+00 |
| B           | West Davignon Diversion | 8.1E+03        | 1.6313              | 1.3E+01           | 3.6E-02            |         |
| F           | Spring Creek            | 3.6E+05        | 0.1100              | 4.0E+01           | 1.1E-01            |         |
|             | Total                   |                |                     | 1.6E+03           | 4.4E+00            |         |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### SULPHATE

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 1.3E+05        | 53.3167             | 6.9E+03           | 1.9E+01            |
| D           | Baseline Road ditch     | 3.8E+04        | 9.1250              | 3.5E+02           | 9.5E-01            |
|             | TOTAL                   |                |                     | 7.3E+03           | 2.0E+01            |
| D           | Bennett Creek           | 3.8E+04        | 11.1219             | 4.2E+02           | 1.2E+00            |
| C           | St. Marys River         | 9.1E+04        | 71.7923             | 6.5E+03           | 1.8E+01            |
| A           | St. Marys River         | 9.9E+04        | 702.9167            | 7.0E+04           | 1.9E+02            |
| E           | St. Marys River         | 3.2E+04        | 71.7923             | 2.3E+03           | 6.3E+00            |
|             | TOTAL                   |                |                     | 7.9E+04           | 2.1E+02            |
| B           | West Davignon Diversion | 2.6E+02        | 1080.5625           | 2.8E+02           | 7.7E-01            |
| F           | Spring Creek            | 3.6E+04        | 29.5667             | 1.1E+03           | 2.9E+00            |
|             | Total                   |                |                     | 8.7E+04           | 2.4E+02            |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 3.9E+03        | 53.3167             | 2.1E+02           | 5.7E-01            |
| D           | Baseline Road ditch     | 9.7E+02        | 9.1250              | 8.9E+00           | 2.4E-02            |
|             | TOTAL                   |                |                     | 2.2E+02           | 6.0E-01            |
| D           | Bennett Creek           | 8.2E+02        | 11.1219             | 9.1E+00           | 2.5E-02            |
| C           | St. Marys River         | 4.9E+03        | 71.7923             | 3.5E+02           | 9.6E-01            |
| A           | St. Marys River         | 1.3E+04        | 702.9167            | 9.4E+03           | 2.6E+01            |
| E           | St. Marys River         | 9.7E+02        | 71.7923             | 6.9E+01           | 1.9E-01            |
|             | TOTAL                   |                |                     | 9.8E+03           | 2.7E+01            |
| B           | West Davignon Diversion | 1.4E+01        | 1080.5625           | 1.5E+01           | 4.2E-02            |
| F           | Spring Creek            | 3.5E+02        | 29.5667             | 1.0E+01           | 2.8E-02            |
|             | Total                   |                |                     | 1.0E+04           | 2.8E+01            |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 9.5E+05        | 53.3167             | 5.1E+04           | 1.4E+02            |
| D           | Baseline Road ditch     | 3.7E+05        | 9.1250              | 3.4E+03           | 9.3E+00            |
|             | TOTAL                   |                |                     | 5.4E+04           | 1.5E+02            |
| D           | Bennett Creek           | 3.6E+05        | 11.1219             | 4.0E+03           | 1.1E+01            |
| C           | St. Marys River         | 6.3E+05        | 71.7923             | 4.5E+04           | 1.2E+02            |
| A           | St. Marys River         | 5.3E+05        | 702.9167            | 3.7E+05           | 1.0E+03            |
| E           | St. Marys River         | 2.9E+05        | 71.7923             | 2.1E+04           | 5.7E+01            |
|             | TOTAL                   |                |                     | 4.4E+05           | 1.2E+03            |
| B           | West Davignon Diversion | 8.1E+03        | 1080.5625           | 8.8E+03           | 2.4E+01            |
| F           | Spring Creek            | 3.6E+05        | 29.5667             | 1.1E+04           | 2.9E+01            |
|             | Total                   |                |                     | 5.1E+05           | 1.4E+03            |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### NITRATE-N

#### Average Flux

| Element | No. | Discharge to            | Flux,q<br>(M3/yr) | Weighted<br>Avg. conc. | Mass Flux<br>(Kg/yr) | Mass Flux<br>(kg/day) |         |
|---------|-----|-------------------------|-------------------|------------------------|----------------------|-----------------------|---------|
| C       |     | Baseline Road ditch     | 1.3E+05           | 0.0200                 | 2.6E+00              | 7.1E-03               |         |
| D       |     | Baseline Road ditch     | 3.8E+04           | 0.0700                 | 2.7E+00              | 7.3E-03               |         |
|         |     | TOTAL                   |                   |                        | 5.3E+00              |                       | 1.4E-02 |
| D       |     | Bennett Creek           | 3.8E+04           | 0.0244                 | 9.3E-01              | 2.5E-03               |         |
| C       |     | St. Marys River         | 9.1E+04           | 0.0363                 | 3.3E+00              | 9.0E-03               |         |
| A       |     | St. Marys River         | 9.9E+04           | 0.0333                 | 3.3E+00              | 9.0E-03               |         |
| E       |     | St. Marys River         | 3.2E+04           | 0.0363                 | 1.2E+00              | 3.2E-03               |         |
|         |     | TOTAL                   |                   |                        | 8.7E+00              |                       | 2.1E-02 |
| B       |     | West Davignon Diversion | 2.6E+02           | 0.0313                 | 8.1E-03              | 2.2E-05               |         |
| F       |     | Spring Creek            | 3.6E+04           | 1.2333                 | 4.4E+01              | 1.2E-01               |         |
|         |     | Total                   |                   |                        | 5.8E+01              | 1.6E-01               |         |

#### Minimum Flux

| Element | No. | Discharge to            | Flux,q<br>(M3/yr) | Weighted<br>Avg. conc. | Mass Flux<br>(Kg/yr) | Mass Flux<br>(kg/day) |         |
|---------|-----|-------------------------|-------------------|------------------------|----------------------|-----------------------|---------|
| C       |     | Baseline Road ditch     | 3.9E+03           | 0.0200                 | 7.8E-02              | 2.1E-04               |         |
| D       |     | Baseline Road ditch     | 9.7E+02           | 0.0700                 | 6.8E-02              | 1.9E-04               |         |
|         |     | TOTAL                   |                   |                        | 1.5E-01              |                       | 4.0E-04 |
| D       |     | Bennett Creek           | 8.2E+02           | 0.0244                 | 2.0E-02              | 5.5E-05               |         |
| C       |     | St. Marys River         | 4.9E+03           | 0.0363                 | 1.8E-01              | 4.8E-04               |         |
| A       |     | St. Marys River         | 1.3E+04           | 0.0333                 | 4.4E-01              | 1.2E-03               |         |
| E       |     | St. Marys River         | 9.7E+02           | 0.0363                 | 3.5E-02              | 9.6E-05               |         |
|         |     | TOTAL                   |                   |                        | 6.8E-01              |                       | 1.8E-03 |
| B       |     | West Davignon Diversion | 1.4E+01           | 0.0313                 | 4.4E-04              | 1.2E-06               |         |
| F       |     | Spring Creek            | 3.5E+02           | 1.2333                 | 4.3E-01              | 1.2E-03               |         |
|         |     | Total                   |                   |                        | 1.3E+00              | 3.4E-03               |         |

#### Maximum Flux

| Element | No. | Discharge to            | Flux,q<br>(M3/yr) | Weighted<br>Avg. conc. | Mass Flux<br>(Kg/yr) | Mass Flux<br>(kg/day) |         |
|---------|-----|-------------------------|-------------------|------------------------|----------------------|-----------------------|---------|
| C       |     | Baseline Road ditch     | 9.5E+05           | 0.0200                 | 1.9E+01              | 5.2E-02               |         |
| D       |     | Baseline Road ditch     | 3.7E+05           | 0.0700                 | 2.6E+01              | 7.1E-02               |         |
|         |     | TOTAL                   |                   |                        | 4.5E+01              |                       | 1.2E-01 |
| D       |     | Bennett Creek           | 3.6E+05           | 0.0244                 | 8.8E+00              | 2.4E-02               |         |
| C       |     | St. Marys River         | 6.3E+05           | 0.0363                 | 2.3E+01              | 6.3E-02               |         |
| A       |     | St. Marys River         | 5.3E+05           | 0.0333                 | 1.8E+01              | 4.8E-02               |         |
| E       |     | St. Marys River         | 2.9E+05           | 0.0363                 | 1.1E+01              | 2.9E-02               |         |
|         |     | TOTAL                   |                   |                        | 6.0E+01              |                       | 1.4E-01 |
| B       |     | West Davignon Diversion | 8.1E+03           | 0.0313                 | 2.5E-01              | 7.0E-04               |         |
| F       |     | Spring Creek            | 3.6E+05           | 1.2333                 | 4.4E+02              | 1.2E+00               |         |
|         |     | Total                   |                   |                        | 5.5E+02              | 1.5E+00               |         |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### TOTAL KJELDAHL NITROGEN

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.1950              | 2.5E+01           | 6.9E-02            |
| D           | Baseline Road ditch     | 3.8E+04        | 17.1500             | 6.5E+02           | 1.8E+00            |
|             | TOTAL                   |                |                     | 6.8E+02           | 1.9E+00            |
| D           | Bennett Creek           | 3.8E+04        | 0.4525              | 1.7E+01           | 4.7E-02            |
| C           | St. Marys River         | 9.1E+04        | 2.8480              | 2.6E+02           | 7.1E-01            |
| A           | St. Marys River         | 9.9E+04        | 4.9702              | 4.9E+02           | 1.3E+00            |
| E           | St. Marys River         | 3.2E+04        | 2.8480              | 9.1E+01           | 2.5E-01            |
|             | TOTAL                   |                |                     | 8.6E+02           | 2.3E+00            |
| B           | West Davignon Diversion | 2.6E+02        | 8.8750              | 2.3E+00           | 6.3E-03            |
| F           | Spring Creek            | 3.6E+04        | 1.8000              | 6.5E+01           | 1.8E-01            |
|             | Total                   |                |                     | 1.6E+03           | 4.4E+00            |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.1950              | 7.6E-01           | 2.1E-03            |
| D           | Baseline Road ditch     | 9.7E+02        | 17.1500             | 1.7E+01           | 4.6E-02            |
|             | TOTAL                   |                |                     | 1.7E+01           | 4.8E-02            |
| D           | Bennett Creek           | 8.2E+02        | 0.4525              | 3.7E-01           | 1.0E-03            |
| C           | St. Marys River         | 4.9E+03        | 2.8480              | 1.4E+01           | 3.8E-02            |
| A           | St. Marys River         | 1.3E+04        | 4.9702              | 6.6E+01           | 1.8E-01            |
| E           | St. Marys River         | 9.7E+02        | 2.8480              | 2.8E+00           | 7.5E-03            |
|             | TOTAL                   |                |                     | 8.3E+01           | 2.3E-01            |
| B           | West Davignon Diversion | 1.4E+01        | 8.8750              | 1.2E-01           | 3.4E-04            |
| F           | Spring Creek            | 3.5E+02        | 1.8000              | 6.3E-01           | 1.7E-03            |
|             | Total                   |                |                     | 1.0E+02           | 2.8E-01            |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.1950              | 1.9E+02           | 5.1E-01            |
| D           | Baseline Road ditch     | 3.7E+05        | 17.1500             | 6.3E+03           | 1.7E+01            |
|             | TOTAL                   |                |                     | 6.5E+03           | 1.8E+01            |
| D           | Bennett Creek           | 3.6E+05        | 0.4525              | 1.6E+02           | 4.5E-01            |
| C           | St. Marys River         | 6.3E+05        | 2.8480              | 1.8E+03           | 4.9E+00            |
| A           | St. Marys River         | 5.3E+05        | 4.9702              | 2.6E+03           | 7.2E+00            |
| E           | St. Marys River         | 2.9E+05        | 2.8480              | 8.3E+02           | 2.3E+00            |
|             | TOTAL                   |                |                     | 5.4E+03           | 1.4E+01            |
| B           | West Davignon Diversion | 8.1E+03        | 8.8750              | 7.2E+01           | 2.0E-01            |
| F           | Spring Creek            | 3.6E+05        | 1.8000              | 6.5E+02           | 1.8E+00            |
|             | Total                   |                |                     | 1.3E+04           | 3.5E+01            |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### TOTAL PHOSPHOROUS

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.1030              | 3.9E+00           | 1.1E-02            |         |
|             | TOTAL                   |                |                     | 3.9E+00           |                    | 1.1E-02 |
| D           | Bennett Creek           | 3.8E+04        | 0.0330              | 1.3E+00           | 3.4E-03            |         |
| C           | St. Marys River         | 9.1E+04        | 0.1677              | 1.5E+01           | 4.2E-02            |         |
| A           | St. Marys River         | 9.9E+04        | 0.1572              | 1.6E+01           | 4.3E-02            |         |
| E           | St. Marys River         | 3.2E+04        | 0.1677              | 5.4E+00           | 1.5E-02            |         |
|             | TOTAL                   |                |                     | 3.7E+01           |                    | 9.9E-02 |
| B           | West Davignon Diversion | 2.6E+02        | 0.3508              | 9.1E-02           | 2.5E-04            |         |
| F           | Spring Creek            | 3.6E+04        | 0.0500              | 1.8E+00           | 4.9E-03            |         |
|             | Total                   |                |                     | 4.3E+01           | 1.2E-01            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.1030              | 1.0E-01           | 2.7E-04            |         |
|             | TOTAL                   |                |                     | 1.0E-01           |                    | 2.7E-04 |
| D           | Bennett Creek           | 8.2E+02        | 0.0330              | 2.7E-02           | 7.4E-05            |         |
| C           | St. Marys River         | 4.9E+03        | 0.1677              | 8.2E-01           | 2.2E-03            |         |
| A           | St. Marys River         | 1.3E+04        | 0.1572              | 2.1E+00           | 5.7E-03            |         |
| E           | St. Marys River         | 9.7E+02        | 0.1677              | 1.6E-01           | 4.4E-04            |         |
|             | TOTAL                   |                |                     | 3.1E+00           |                    | 8.4E-03 |
| B           | West Davignon Diversion | 1.4E+01        | 0.3508              | 4.9E-03           | 1.4E-05            |         |
| F           | Spring Creek            | 3.5E+02        | 0.0500              | 1.8E-02           | 4.8E-05            |         |
|             | Total                   |                |                     | 3.2E+00           | 8.8E-03            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.1030              | 3.8E+01           | 1.0E-01            |         |
|             | TOTAL                   |                |                     | 3.8E+01           |                    | 1.0E-01 |
| D           | Bennett Creek           | 3.6E+05        | 0.0330              | 1.2E+01           | 3.3E-02            |         |
| C           | St. Marys River         | 6.3E+05        | 0.1677              | 1.1E+02           | 2.9E-01            |         |
| A           | St. Marys River         | 5.3E+05        | 0.1572              | 8.3E+01           | 2.3E-01            |         |
| E           | St. Marys River         | 2.9E+05        | 0.1677              | 4.9E+01           | 1.3E-01            |         |
|             | TOTAL                   |                |                     | 2.5E+02           |                    | 6.5E-01 |
| B           | West Davignon Diversion | 8.1E+03        | 0.3508              | 2.9E+00           | 7.8E-03            |         |
| F           | Spring Creek            | 3.6E+05        | 0.0500              | 1.8E+01           | 4.9E-02            |         |
|             | Total                   |                |                     | 3.1E+02           | 8.4E-01            |         |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### PHENOLS

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0005              | 6.5E-02           | 1.8E-04            |
| D           | Baseline Road ditch     | 3.8E+04        | 0.1333              | 5.1E+00           | 1.4E-02            |
|             | TOTAL                   |                |                     | 5.1E+00           | 1.4E-02            |
| D           | Bennett Creek           | 3.8E+04        | 0.0017              | 6.4E-02           | 1.8E-04            |
| C           | St. Marys River         | 9.1E+04        | 0.0056              | 5.1E-01           | 1.4E-03            |
| A           | St. Marys River         | 9.9E+04        | 0.0180              | 1.8E+00           | 4.9E-03            |
| E           | St. Marys River         | 3.2E+04        | 0.0056              | 1.8E-01           | 4.9E-04            |
|             | TOTAL                   |                |                     | 2.5E+00           | 6.8E-03            |
| B           | West Davignon Diversion | 2.6E+02        | 0.0042              | 1.1E-03           | 3.0E-06            |
| F           | Spring Creek            | 3.6E+04        | 0.0668              | 2.4E+00           | 6.6E-03            |
|             | Total                   |                |                     | 1.0E+01           | 2.8E-02            |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0005              | 2.0E-03           | 5.4E-06            |
| D           | Baseline Road ditch     | 9.7E+02        | 0.1333              | 1.3E-01           | 3.5E-04            |
|             | TOTAL                   |                |                     | 1.3E-01           | 3.6E-04            |
| D           | Bennett Creek           | 8.2E+02        | 0.0017              | 1.4E-03           | 3.8E-06            |
| C           | St. Marys River         | 4.9E+03        | 0.0056              | 2.7E-02           | 7.5E-05            |
| A           | St. Marys River         | 1.3E+04        | 0.0180              | 2.4E-01           | 6.6E-04            |
| E           | St. Marys River         | 9.7E+02        | 0.0056              | 5.4E-03           | 1.5E-05            |
|             | TOTAL                   |                |                     | 2.7E-01           | 7.5E-04            |
| B           | West Davignon Diversion | 1.4E+01        | 0.0042              | 5.9E-05           | 1.6E-07            |
| F           | Spring Creek            | 3.5E+02        | 0.0668              | 2.3E-02           | 6.4E-05            |
|             | Total                   |                |                     | 4.3E-01           | 1.2E-03            |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0005              | 4.8E-01           | 1.3E-03            |
| D           | Baseline Road ditch     | 3.7E+05        | 0.1333              | 4.9E+01           | 1.4E-01            |
|             | TOTAL                   |                |                     | 5.0E+01           | 1.4E-01            |
| D           | Bennett Creek           | 3.6E+05        | 0.0017              | 6.1E-01           | 1.7E-03            |
| C           | St. Marys River         | 6.3E+05        | 0.0056              | 3.5E+00           | 9.7E-03            |
| A           | St. Marys River         | 5.3E+05        | 0.0180              | 9.5E+00           | 2.6E-02            |
| E           | St. Marys River         | 2.9E+05        | 0.0056              | 1.6E+00           | 4.5E-03            |
|             | TOTAL                   |                |                     | 1.5E+01           | 4.0E-02            |
| B           | West Davignon Diversion | 8.1E+03        | 0.0042              | 3.4E-02           | 9.3E-05            |
| F           | Spring Creek            | 3.6E+05        | 0.0668              | 2.4E+01           | 6.6E-02            |
|             | Total                   |                |                     | 8.9E+01           | 2.4E-01            |



## Appendix 9: Mass Flux Estimations - Anions and Organics

### TOTAL BTX

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |  |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|--|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |  |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |  |         |
|             | TOTAL                   |                |                     |                   | 0.0E+00            |  | 0.0E+00 |
| D           | Bennett Creek           | 3.8E+04        | 31.5000             | 1.2E+00           | 3.3E-03            |  |         |
| C           | St. Marys River         | 9.1E+04        | 23.2000             | 2.1E+00           | 5.8E-03            |  |         |
| A           | St. Marys River         | 9.9E+04        | 17.5833             | 1.7E+00           | 4.8E-03            |  |         |
| E           | St. Marys River         | 3.2E+04        | 23.2000             | 7.4E-01           | 2.0E-03            |  |         |
|             | TOTAL                   |                |                     |                   | 5.8E+00            |  | 1.3E-02 |
| B           | West Davignon Diversion | 2.6E+02        | 49.5000             | 1.3E-02           | 3.5E-05            |  |         |
| F           | Spring Creek            | 3.6E+04        | 4318.0000           | 1.6E+02           | 4.3E-01            |  |         |
|             | Total                   |                |                     | 1.6E+02           | 4.4E-01            |  |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |  |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|--|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0000              | 0.0E+00           | 0.0E+00            |  |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |  |         |
|             | TOTAL                   |                |                     |                   | 0.0E+00            |  | 0.0E+00 |
| D           | Bennett Creek           | 8.2E+02        | 31.5000             | 2.6E-02           | 7.1E-05            |  |         |
| C           | St. Marys River         | 4.9E+03        | 23.2000             | 1.1E-01           | 3.1E-04            |  |         |
| A           | St. Marys River         | 1.3E+04        | 17.5833             | 2.3E-01           | 6.4E-04            |  |         |
| E           | St. Marys River         | 9.7E+02        | 23.2000             | 2.2E-02           | 6.1E-05            |  |         |
|             | TOTAL                   |                |                     |                   | 4.0E-01            |  | 1.0E-03 |
| B           | West Davignon Diversion | 1.4E+01        | 49.5000             | 7.0E-04           | 1.9E-06            |  |         |
| F           | Spring Creek            | 3.5E+02        | 4318.0000           | 1.5E+00           | 4.1E-03            |  |         |
|             | Total                   |                |                     | 1.9E+00           | 5.2E-03            |  |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |  |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|--|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |  |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |  |         |
|             | TOTAL                   |                |                     |                   | 0.0E+00            |  | 0.0E+00 |
| D           | Bennett Creek           | 3.6E+05        | 31.5000             | 1.1E+01           | 3.1E-02            |  |         |
| C           | St. Marys River         | 6.3E+05        | 23.2000             | 1.5E+01           | 4.0E-02            |  |         |
| A           | St. Marys River         | 5.3E+05        | 17.5833             | 9.3E+00           | 2.5E-02            |  |         |
| E           | St. Marys River         | 2.9E+05        | 23.2000             | 6.7E+00           | 1.8E-02            |  |         |
|             | TOTAL                   |                |                     |                   | 4.2E+01            |  | 8.4E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 49.5000             | 4.0E-01           | 1.1E-03            |  |         |
| F           | Spring Creek            | 3.6E+05        | 4318.0000           | 1.6E+03           | 4.3E+00            |  |         |
|             | Total                   |                |                     | 1.6E+03           | 4.4E+00            |  |         |

## Appendix 9: Mass Flux Estimations - Anions and Organics

### TOTAL PAH

#### Average Flux

| Element | No. | Discharge to            | Flux,q<br>(M3/yr) | Weighted<br>Avg. conc. | Mass Flux<br>(Kg/yr) | Mass Flux<br>(kg/day) |  |
|---------|-----|-------------------------|-------------------|------------------------|----------------------|-----------------------|--|
| C       |     | Baseline Road ditch     | 1.3E+05           | 0.0000                 | 0.0E+00              | 0.0E+00               |  |
| D       |     | Baseline Road ditch     | 3.8E+04           | 12.2567                | 4.7E-01              | 1.3E-03               |  |
|         |     | TOTAL                   |                   |                        | 4.7E-01              | 1.3E-03               |  |
| D       |     | Bennett Creek           | 3.8E+04           | 1.5750                 | 6.0E-02              | 1.6E-04               |  |
| C       |     | St. Marys River         | 9.1E+04           | 11.3591                | 1.0E+00              | 2.8E-03               |  |
| A       |     | St. Marys River         | 9.9E+04           | 14.2694                | 1.4E+00              | 3.9E-03               |  |
| E       |     | St. Marys River         | 3.2E+04           | 11.3591                | 3.6E-01              | 1.0E-03               |  |
|         |     | TOTAL                   |                   |                        | 2.9E+00              | 7.7E-03               |  |
| B       |     | West Davignon Diversion | 2.6E+02           | 1.3625                 | 3.5E-04              | 9.7E-07               |  |
| F       |     | Spring Creek            | 3.6E+04           | 5295.4000              | 1.9E+02              | 5.2E-01               |  |
|         |     | Total                   |                   |                        | 1.9E+02              | 5.3E-01               |  |

#### Minimum Flux

| Element | No. | Discharge to            | Flux,q<br>(M3/yr) | Weighted<br>Avg. conc. | Mass Flux<br>(Kg/yr) | Mass Flux<br>(kg/day) |  |
|---------|-----|-------------------------|-------------------|------------------------|----------------------|-----------------------|--|
| C       |     | Baseline Road ditch     | 3.9E+03           | 0.0000                 | 0.0E+00              | 0.0E+00               |  |
| D       |     | Baseline Road ditch     | 9.7E+02           | 12.2567                | 1.2E-02              | 3.3E-05               |  |
|         |     | TOTAL                   |                   |                        | 1.2E-02              | 3.3E-05               |  |
| D       |     | Bennett Creek           | 8.2E+02           | 1.5750                 | 1.3E-03              | 3.5E-06               |  |
| C       |     | St. Marys River         | 4.9E+03           | 11.3591                | 5.5E-02              | 1.5E-04               |  |
| A       |     | St. Marys River         | 1.3E+04           | 14.2694                | 1.9E-01              | 5.2E-04               |  |
| E       |     | St. Marys River         | 9.7E+02           | 11.3591                | 1.1E-02              | 3.0E-05               |  |
|         |     | TOTAL                   |                   |                        | 2.6E-01              | 7.0E-04               |  |
| B       |     | West Davignon Diversion | 1.4E+01           | 1.3625                 | 1.9E-05              | 5.2E-08               |  |
| F       |     | Spring Creek            | 3.5E+02           | 5295.4000              | 1.9E+00              | 5.1E-03               |  |
|         |     | Total                   |                   |                        | 2.1E+00              | 5.8E-03               |  |

#### Maximum Flux

| Element | No. | Discharge to            | Flux,q<br>(M3/yr) | Weighted<br>Avg. conc. | Mass Flux<br>(Kg/yr) | Mass Flux<br>(kg/day) |  |
|---------|-----|-------------------------|-------------------|------------------------|----------------------|-----------------------|--|
| C       |     | Baseline Road ditch     | 9.5E+05           | 0.0000                 | 0.0E+00              | 0.0E+00               |  |
| D       |     | Baseline Road ditch     | 3.7E+05           | 12.2567                | 4.5E+00              | 1.2E-02               |  |
|         |     | TOTAL                   |                   |                        | 4.5E+00              | 1.2E-02               |  |
| D       |     | Bennett Creek           | 3.6E+05           | 1.5750                 | 5.7E-01              | 1.6E-03               |  |
| C       |     | St. Marys River         | 6.3E+05           | 11.3591                | 7.2E+00              | 2.0E-02               |  |
| A       |     | St. Marys River         | 5.3E+05           | 14.2694                | 7.5E+00              | 2.1E-02               |  |
| E       |     | St. Marys River         | 2.9E+05           | 11.3591                | 3.3E+00              | 9.0E-03               |  |
|         |     | TOTAL                   |                   |                        | 1.9E+01              | 4.9E-02               |  |
| B       |     | West Davignon Diversion | 8.1E+03           | 1.3625                 | 1.1E-02              | 3.0E-05               |  |
| F       |     | Spring Creek            | 3.6E+05           | 5295.4000              | 1.9E+03              | 5.2E+00               |  |
|         |     | Total                   |                   |                        | 1.9E+03              | 5.3E+00               |  |

## Appendix 9: Mass Flux Estimates - Metals

Weighted Average concentrations - see Table 9.1 for Formulae

| Element No.<br>Discharge To | A<br>SMR | C<br>SMR | E<br>SMR | B<br>WDD | B<br>BRD | C<br>BRD | D<br>BRD | D<br>BC | F<br>SC |
|-----------------------------|----------|----------|----------|----------|----------|----------|----------|---------|---------|
| ZINC                        | 0.0065   | 0.0093   | 0.0093   | 0.0258   | 0.0000   | 0.0075   | 0.0000   | 0.0033  | 0.0000  |
| CADMIUM                     | 0.0011   | 0.0003   | 0.0003   | 0.0003   | 0.0010   | 0.0006   | 0.0002   | 0.0001  | 0.0006  |
| MANGANESE                   | 0.2835   | 0.0331   | 0.0331   | 2.1450   | 0.1000   | 0.4550   | 0.0700   | 0.0883  | 0.1850  |
| COBALT                      | 0.0108   | 0.0089   | 0.0089   | 0.0125   | 0.0000   | 0.0025   | 0.0000   | 0.0000  | 0.0000  |
| COPPER                      | 0.0031   | 0.0014   | 0.0014   | 0.0063   | 0.0050   | 0.0025   | 0.0067   | 0.0063  | 0.0000  |
| IRON                        | 5.4913   | 0.1312   | 0.1312   | 31.6117  | 0.2000   | 5.1750   | 0.5800   | 0.0833  | 0.7700  |
| LEAD                        | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000  | 0.0000  |
| CHROMIUM                    | 0.0171   | 0.0103   | 0.0103   | 0.0204   | 0.0000   | 0.0050   | 0.0033   | 0.0000  | 0.0000  |
| NICKEL                      | 0.0073   | 0.0030   | 0.0030   | 0.0142   | 0.0000   | 0.0000   | 0.0033   | 0.0000  | 0.0000  |
| BERYLLIUM                   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | -        | 0.0000   | 0.0000   | 0.0000  | 0.0000  |
| MOLYBDENUM                  | 0.0310   | 0.0150   | 0.0150   | 0.0263   | -        | 0.0050   | 0.0200   | 0.0013  | 0.0000  |
| CALCIUM                     | 304.8500 | 214.8408 | 214.8408 | 370.0000 | 15.2000  | 30.8500  | 101.2500 | 45.2667 | 37.7500 |
| VANADIUM                    | 0.0444   | 0.0222   | 0.0222   | 0.0388   | -        | 0.0000   | 0.0233   | 0.0075  | 0.0000  |
| ALUMINUM                    | 0.4078   | 0.3897   | 0.3897   | 0.3900   | -        | 0.0600   | 0.5600   | 0.2000  | 0.1400  |
| MAGNESIUM                   | 5.8771   | 2.5356   | 2.5356   | 93.2500  | 2.0000   | 6.9250   | 2.0500   | 7.1042  | 1.8125  |
| BARIUM                      | 0.0915   | 0.2476   | 0.2476   | 0.0813   | -        | 0.0150   | 0.0467   | 0.0338  | 0.0500  |
| POTASSIUM                   | 197.6417 | 49.1350  | 49.1350  | 207.0000 | 1.6500   | 3.5500   | 9.7000   | 1.8000  | 5.4250  |
| STRONTIUM                   | 1.1988   | 0.8341   | 0.8341   | 1.3288   | -        | 0.2250   | 0.3200   | 0.1725  | 0.0800  |
| SODIUM                      | 71.7000  | 43.4521  | 43.4521  | 153.5000 | 15.0000  | 18.2500  | 61.2500  | 12.1250 | 14.8750 |
| ARSENIC (ug/L)              | 0.5333   | 0.0000   | 0.0000   | 0.0000   | -        | 0.0000   | -        | 0.0000  | 7.0000  |
| SELENIUM (ug/L)             | 0.1333   | 0.0000   | 0.0000   | 0.0000   | -        | 0.0000   | -        | 0.0000  | 0.0000  |
| MERCURY (ug/L)              | 0.0105   | 0.0000   | 0.0000   | 0.0000   | -        | 0.0000   | -        | 0.0000  | 0.0000  |

\* SMR = St. Marys River

WDD = West Davignon Diversion

Concentrations in mg/L unless otherwise specified

BRD = Baseline Road Ditch

BC = Bennett Creek

SC = Spring Creek

## Appendix 9: Mass Flux Estimates - Metals

### ZINC

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0075              | 9.8E-01           | 2.7E-03            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | TOTAL                   |                |                     |                   | 9.8E-01            | 2.7E-03 |
| D           | Bennett Creek           | 3.8E+04        | 0.0033              | 1.3E-01           | 3.5E-04            |         |
| C           | St. Marys River         | 9.1E+04        | 0.0093              | 8.4E-01           | 2.3E-03            |         |
| A           | St. Marys River         | 9.9E+04        | 0.0065              | 6.4E-01           | 1.8E-03            |         |
| E           | St. Marys River         | 3.2E+04        | 0.0093              | 3.0E-01           | 8.1E-04            |         |
|             | TOTAL                   |                |                     |                   | 1.8E+00            | 4.9E-03 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0258              | 6.7E-03           | 1.8E-05            |         |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | Total                   |                |                     | 2.9E+00           | 7.9E-03            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0075              | 2.9E-02           | 8.0E-05            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | TOTAL                   |                |                     |                   | 2.9E-02            | 8.0E-05 |
| D           | Bennett Creek           | 8.2E+02        | 0.0033              | 2.7E-03           | 7.5E-06            |         |
| C           | St. Marys River         | 4.9E+03        | 0.0093              | 4.5E-02           | 1.2E-04            |         |
| A           | St. Marys River         | 1.3E+04        | 0.0065              | 8.7E-02           | 2.4E-04            |         |
| E           | St. Marys River         | 9.7E+02        | 0.0093              | 8.9E-03           | 2.5E-05            |         |
|             | TOTAL                   |                |                     |                   | 1.4E-01            | 3.9E-04 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0258              | 3.6E-04           | 9.9E-07            |         |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | Total                   |                |                     | 1.7E-01           | 4.7E-04            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0075              | 7.1E+00           | 2.0E-02            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | TOTAL                   |                |                     |                   | 7.1E+00            | 2.0E-02 |
| D           | Bennett Creek           | 3.6E+05        | 0.0033              | 1.2E+00           | 3.3E-03            |         |
| C           | St. Marys River         | 6.3E+05        | 0.0093              | 5.8E+00           | 1.6E-02            |         |
| A           | St. Marys River         | 5.3E+05        | 0.0065              | 3.4E+00           | 9.4E-03            |         |
| E           | St. Marys River         | 2.9E+05        | 0.0093              | 2.7E+00           | 7.4E-03            |         |
|             | TOTAL                   |                |                     |                   | 1.2E+01            | 3.3E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0258              | 2.1E-01           | 5.8E-04            |         |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | Total                   |                |                     | 2.0E+01           | 5.6E-02            |         |

## Appendix 9: Mass Flux Estimates - Metals

### CADMIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0006              | 7.2E-02           | 2.0E-04            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0002              | 6.3E-03           | 1.7E-05            |                 |
|             | TOTAL                   |                |                     |                   |                    | 7.8E-02 2.1E-04 |
| D           | Bennett Creek           | 3.8E+04        | 0.0001              | 5.1E-03           | 1.4E-05            |                 |
| C           | St. Marys River         | 9.1E+04        | 0.0003              | 2.6E-02           | 7.1E-05            |                 |
| A           | St. Marys River         | 9.9E+04        | 0.0011              | 1.1E-01           | 2.9E-04            |                 |
| E           | St. Marys River         | 3.2E+04        | 0.0003              | 9.1E-03           | 2.5E-05            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.5E-01 3.9E-04 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0003              | 6.9E-05           | 1.9E-07            |                 |
| F           | Spring Creek            | 3.6E+04        | 0.0006              | 2.2E-02           | 5.9E-05            |                 |
|             | Total                   |                |                     | 2.5E-01           | 6.7E-04            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0006              | 2.2E-03           | 5.9E-06            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0002              | 1.6E-04           | 4.4E-07            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.3E-03 6.3E-06 |
| D           | Bennett Creek           | 8.2E+02        | 0.0001              | 1.1E-04           | 3.0E-07            |                 |
| C           | St. Marys River         | 4.9E+03        | 0.0003              | 1.4E-03           | 3.8E-06            |                 |
| A           | St. Marys River         | 1.3E+04        | 0.0011              | 1.4E-02           | 3.9E-05            |                 |
| E           | St. Marys River         | 9.7E+02        | 0.0003              | 2.7E-04           | 7.5E-07            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.6E-02 4.4E-05 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0003              | 3.7E-06           | 1.0E-08            |                 |
| F           | Spring Creek            | 3.5E+02        | 0.0006              | 2.1E-04           | 5.8E-07            |                 |
|             | Total                   |                |                     | 1.9E-02           | 5.1E-05            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0006              | 5.2E-01           | 1.4E-03            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0002              | 6.2E-02           | 1.7E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 5.8E-01 1.6E-03 |
| D           | Bennett Creek           | 3.6E+05        | 0.0001              | 4.8E-02           | 1.3E-04            |                 |
| C           | St. Marys River         | 6.3E+05        | 0.0003              | 1.8E-01           | 4.9E-04            |                 |
| A           | St. Marys River         | 5.3E+05        | 0.0011              | 5.6E-01           | 1.5E-03            |                 |
| E           | St. Marys River         | 2.9E+05        | 0.0003              | 8.2E-02           | 2.2E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 8.7E-01 2.3E-03 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0003              | 2.2E-03           | 6.0E-06            |                 |
| F           | Spring Creek            | 3.6E+05        | 0.0006              | 2.2E-01           | 5.9E-04            |                 |
|             | Total                   |                |                     | 1.7E+00           | 4.6E-03            |                 |

## Appendix 9: Mass Flux Estimates - Metals

### MANGANESE

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.4550              | 5.9E+01           | 1.6E-01            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0700              | 2.7E+00           | 7.3E-03            |         |
|             | TOTAL                   |                |                     |                   | 6.2E+01            | 1.7E-01 |
| D           | Bennett Creek           | 3.8E+04        | 0.0883              | 3.4E+00           | 9.2E-03            |         |
| C           | St. Marys River         | 9.1E+04        | 0.0331              | 3.0E+00           | 8.3E-03            |         |
| A           | St. Marys River         | 9.9E+04        | 0.2835              | 2.8E+01           | 7.7E-02            |         |
| E           | St. Marys River         | 3.2E+04        | 0.0331              | 1.1E+00           | 2.9E-03            |         |
|             | TOTAL                   |                |                     |                   | 3.5E+01            | 8.8E-02 |
| B           | West Davignon Diversion | 2.6E+02        | 2.1450              | 5.6E-01           | 1.5E-03            |         |
| F           | Spring Creek            | 3.6E+04        | 0.1850              | 6.7E+00           | 1.8E-02            |         |
|             | Total                   |                |                     | 1.0E+02           | 2.9E-01            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.4550              | 1.8E+00           | 4.9E-03            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0700              | 6.8E-02           | 1.9E-04            |         |
|             | TOTAL                   |                |                     |                   | 1.8E+00            | 5.1E-03 |
| D           | Bennett Creek           | 8.2E+02        | 0.0883              | 7.2E-02           | 2.0E-04            |         |
| C           | St. Marys River         | 4.9E+03        | 0.0331              | 1.6E-01           | 4.4E-04            |         |
| A           | St. Marys River         | 1.3E+04        | 0.2835              | 3.8E+00           | 1.0E-02            |         |
| E           | St. Marys River         | 9.7E+02        | 0.0331              | 3.2E-02           | 8.8E-05            |         |
|             | TOTAL                   |                |                     |                   | 4.0E+00            | 1.1E-02 |
| B           | West Davignon Diversion | 1.4E+01        | 2.1450              | 3.0E-02           | 8.3E-05            |         |
| F           | Spring Creek            | 3.5E+02        | 0.1850              | 6.5E-02           | 1.8E-04            |         |
|             | Total                   |                |                     | 6.0E+00           | 1.6E-02            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.4550              | 4.3E+02           | 1.2E+00            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0700              | 2.6E+01           | 7.1E-02            |         |
|             | TOTAL                   |                |                     |                   | 4.6E+02            | 1.3E+00 |
| D           | Bennett Creek           | 3.6E+05        | 0.0883              | 3.2E+01           | 8.7E-02            |         |
| C           | St. Marys River         | 6.3E+05        | 0.0331              | 2.1E+01           | 5.7E-02            |         |
| A           | St. Marys River         | 5.3E+05        | 0.2835              | 1.5E+02           | 4.1E-01            |         |
| E           | St. Marys River         | 2.9E+05        | 0.0331              | 9.6E+00           | 2.6E-02            |         |
|             | TOTAL                   |                |                     |                   | 2.1E+02            | 4.9E-01 |
| B           | West Davignon Diversion | 8.1E+03        | 2.1450              | 1.7E+01           | 4.8E-02            |         |
| F           | Spring Creek            | 3.6E+05        | 0.1850              | 6.7E+01           | 1.8E-01            |         |
|             | Total                   |                |                     | 7.5E+02           | 2.1E+00            |         |

## Appendix 9: Mass Flux Estimates - Metals

### COBALT

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0025              | 3.3E-01           | 8.9E-04            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | TOTAL                   |                |                     |                   |                    | 3.3E-01 8.9E-04 |
| D           | Bennett Creek           | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 9.1E+04        | 0.0089              | 8.1E-01           | 2.2E-03            |                 |
| A           | St. Marys River         | 9.9E+04        | 0.0108              | 1.1E+00           | 2.9E-03            |                 |
| E           | St. Marys River         | 3.2E+04        | 0.0089              | 2.9E-01           | 7.8E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.2E+00 6.0E-03 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0125              | 3.3E-03           | 8.9E-06            |                 |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 2.5E+00           | 6.9E-03            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0025              | 9.8E-03           | 2.7E-05            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | TOTAL                   |                |                     |                   |                    | 9.8E-03 2.7E-05 |
| D           | Bennett Creek           | 8.2E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 4.9E+03        | 0.0089              | 4.4E-02           | 1.2E-04            |                 |
| A           | St. Marys River         | 1.3E+04        | 0.0108              | 1.4E-01           | 4.0E-04            |                 |
| E           | St. Marys River         | 9.7E+02        | 0.0089              | 8.6E-03           | 2.4E-05            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.0E-01 5.4E-04 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0125              | 1.8E-04           | 4.8E-07            |                 |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 2.1E-01           | 5.7E-04            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0025              | 2.4E+00           | 6.5E-03            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.4E+00 6.5E-03 |
| D           | Bennett Creek           | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 6.3E+05        | 0.0089              | 5.6E+00           | 1.5E-02            |                 |
| A           | St. Marys River         | 5.3E+05        | 0.0108              | 5.7E+00           | 1.6E-02            |                 |
| E           | St. Marys River         | 2.9E+05        | 0.0089              | 2.6E+00           | 7.1E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.4E+01 3.8E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0125              | 1.0E-01           | 2.8E-04            |                 |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 1.6E+01           | 4.5E-02            |                 |

## Appendix 9: Mass Flux Estimates - Metals

### COPPER

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |  |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|--|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0025              | 3.3E-01           | 8.9E-04            |  |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0067              | 2.5E-01           | 6.9E-04            |  |
|             | TOTAL                   |                |                     | 5.8E-01           | 1.6E-03            |  |
| D           | Bennett Creek           | 3.8E+04        | 0.0063              | 2.4E-01           | 6.5E-04            |  |
| C           | St. Marys River         | 9.1E+04        | 0.0014              | 1.3E-01           | 3.5E-04            |  |
| A           | St. Marys River         | 9.9E+04        | 0.0031              | 3.1E-01           | 8.4E-04            |  |
| E           | St. Marys River         | 3.2E+04        | 0.0014              | 4.5E-02           | 1.2E-04            |  |
|             | TOTAL                   |                |                     | 7.1E-01           | 1.3E-03            |  |
| B           | West Davignon Diversion | 2.6E+02        | 0.0063              | 1.6E-03           | 4.5E-06            |  |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |  |
|             | Total                   |                |                     | 1.3E+00           | 3.5E-03            |  |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |  |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|--|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0025              | 9.8E-03           | 2.7E-05            |  |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0067              | 6.5E-03           | 1.8E-05            |  |
|             | TOTAL                   |                |                     | 1.6E-02           | 4.5E-05            |  |
| D           | Bennett Creek           | 8.2E+02        | 0.0063              | 5.1E-03           | 1.4E-05            |  |
| C           | St. Marys River         | 4.9E+03        | 0.0014              | 6.8E-03           | 1.9E-05            |  |
| A           | St. Marys River         | 1.3E+04        | 0.0031              | 4.1E-02           | 1.1E-04            |  |
| E           | St. Marys River         | 9.7E+02        | 0.0014              | 1.4E-03           | 3.7E-06            |  |
|             | TOTAL                   |                |                     | 5.4E-02           | 1.4E-04            |  |
| B           | West Davignon Diversion | 1.4E+01        | 0.0063              | 8.8E-05           | 2.4E-07            |  |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |  |
|             | Total                   |                |                     | 7.1E-02           | 1.9E-04            |  |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |  |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|--|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0025              | 2.4E+00           | 6.5E-03            |  |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0067              | 2.5E+00           | 6.8E-03            |  |
|             | TOTAL                   |                |                     | 4.8E+00           | 1.3E-02            |  |
| D           | Bennett Creek           | 3.6E+05        | 0.0063              | 2.3E+00           | 6.2E-03            |  |
| C           | St. Marys River         | 6.3E+05        | 0.0014              | 8.8E-01           | 2.4E-03            |  |
| A           | St. Marys River         | 5.3E+05        | 0.0031              | 1.6E+00           | 4.5E-03            |  |
| E           | St. Marys River         | 2.9E+05        | 0.0014              | 4.1E-01           | 1.1E-03            |  |
|             | TOTAL                   |                |                     | 5.2E+00           | 8.0E-03            |  |
| B           | West Davignon Diversion | 8.1E+03        | 0.0063              | 5.1E-02           | 1.4E-04            |  |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |  |
|             | Total                   |                |                     | 1.0E+01           | 2.8E-02            |  |



## Appendix 9: Mass Flux Estimates - Metals

### IRON

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |  |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|--|
| C           | Baseline Road ditch     | 1.3E+05        | 5.1750              | 6.7E+02           | 1.8E+00            |         |  |
| D           | Baseline Road ditch     | 3.8E+04        | 0.5800              | 2.2E+01           | 6.0E-02            |         |  |
|             | TOTAL                   |                |                     |                   | 6.9E+02            | 1.9E+00 |  |
| D           | Bennett Creek           | 3.8E+04        | 0.0833              | 3.2E+00           | 8.7E-03            |         |  |
| C           | St. Marys River         | 9.1E+04        | 0.1312              | 1.2E+01           | 3.3E-02            |         |  |
| A           | St. Marys River         | 9.9E+04        | 5.4913              | 5.4E+02           | 1.5E+00            |         |  |
| E           | St. Marys River         | 3.2E+04        | 0.1312              | 4.2E+00           | 1.1E-02            |         |  |
|             | TOTAL                   |                |                     |                   | 5.6E+02            | 1.5E+00 |  |
| B           | West Davignon Diversion | 2.6E+02        | 31.6117             | 8.2E+00           | 2.3E-02            |         |  |
| F           | Spring Creek            | 3.6E+04        | 0.7700              | 2.8E+01           | 7.6E-02            |         |  |
|             | Total                   |                |                     | 1.3E+03           | 3.5E+00            |         |  |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |  |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|--|
| C           | Baseline Road ditch     | 3.9E+03        | 5.1750              | 2.0E+01           | 5.5E-02            |         |  |
| D           | Baseline Road ditch     | 9.7E+02        | 0.5800              | 5.6E-01           | 1.5E-03            |         |  |
|             | TOTAL                   |                |                     |                   | 2.1E+01            | 5.7E-02 |  |
| D           | Bennett Creek           | 8.2E+02        | 0.0833              | 6.8E-02           | 1.9E-04            |         |  |
| C           | St. Marys River         | 4.9E+03        | 0.1312              | 6.4E-01           | 1.8E-03            |         |  |
| A           | St. Marys River         | 1.3E+04        | 5.4913              | 7.3E+01           | 2.0E-01            |         |  |
| E           | St. Marys River         | 9.7E+02        | 0.1312              | 1.3E-01           | 3.5E-04            |         |  |
|             | TOTAL                   |                |                     |                   | 7.4E+01            | 2.0E-01 |  |
| B           | West Davignon Diversion | 1.4E+01        | 31.6117             | 4.4E-01           | 1.2E-03            |         |  |
| F           | Spring Creek            | 3.5E+02        | 0.7700              | 2.7E-01           | 7.4E-04            |         |  |
|             | Total                   |                |                     | 9.6E+01           | 2.6E-01            |         |  |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |  |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|--|
| C           | Baseline Road ditch     | 9.5E+05        | 5.1750              | 4.9E+03           | 1.3E+01            |         |  |
| D           | Baseline Road ditch     | 3.7E+05        | 0.5800              | 2.1E+02           | 5.9E-01            |         |  |
|             | TOTAL                   |                |                     |                   | 5.1E+03            | 1.4E+01 |  |
| D           | Bennett Creek           | 3.6E+05        | 0.0833              | 3.0E+01           | 8.2E-02            |         |  |
| C           | St. Marys River         | 6.3E+05        | 0.1312              | 8.3E+01           | 2.3E-01            |         |  |
| A           | St. Marys River         | 5.3E+05        | 5.4913              | 2.9E+03           | 7.9E+00            |         |  |
| E           | St. Marys River         | 2.9E+05        | 0.1312              | 3.8E+01           | 1.0E-01            |         |  |
|             | TOTAL                   |                |                     |                   | 3.0E+03            | 8.3E+00 |  |
| B           | West Davignon Diversion | 8.1E+03        | 31.6117             | 2.6E+02           | 7.1E-01            |         |  |
| F           | Spring Creek            | 3.6E+05        | 0.7700              | 2.8E+02           | 7.6E-01            |         |  |
|             | Total                   |                |                     | 8.7E+03           | 2.4E+01            |         |  |

## Appendix 9: Mass Flux Estimates - Metals

### CHROMIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0050              | 6.5E-01           | 1.8E-03            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0033              | 1.3E-01           | 3.5E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 7.8E-01 2.1E-03 |
| D           | Bennett Creek           | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 9.1E+04        | 0.0103              | 9.3E-01           | 2.6E-03            |                 |
| A           | St. Marys River         | 9.9E+04        | 0.0171              | 1.7E+00           | 4.6E-03            |                 |
| E           | St. Marys River         | 3.2E+04        | 0.0103              | 3.3E-01           | 9.0E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 3.0E+00 8.1E-03 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0204              | 5.3E-03           | 1.5E-05            |                 |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 3.7E+00           | 1.0E-02            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0050              | 2.0E-02           | 5.4E-05            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0033              | 3.2E-03           | 8.9E-06            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.3E-02 6.2E-05 |
| D           | Bennett Creek           | 8.2E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 4.9E+03        | 0.0103              | 5.0E-02           | 1.4E-04            |                 |
| A           | St. Marys River         | 1.3E+04        | 0.0171              | 2.3E-01           | 6.2E-04            |                 |
| E           | St. Marys River         | 9.7E+02        | 0.0103              | 9.9E-03           | 2.7E-05            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.9E-01 7.9E-04 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0204              | 2.9E-04           | 7.9E-07            |                 |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 3.1E-01           | 8.5E-04            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0050              | 4.8E+00           | 1.3E-02            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0033              | 1.2E+00           | 3.4E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 6.0E+00 1.6E-02 |
| D           | Bennett Creek           | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 6.3E+05        | 0.0103              | 6.5E+00           | 1.8E-02            |                 |
| A           | St. Marys River         | 5.3E+05        | 0.0171              | 9.0E+00           | 2.5E-02            |                 |
| E           | St. Marys River         | 2.9E+05        | 0.0103              | 3.0E+00           | 8.2E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.8E+01 5.1E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0204              | 1.7E-01           | 4.6E-04            |                 |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 2.5E+01           | 6.7E-02            |                 |

## Appendix 9: Mass Flux Estimates - Metals

### NICKEL

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0033              | 1.3E-01           | 3.5E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.3E-01 3.5E-04 |
| D           | Bennett Creek           | 3.8E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 9.1E+04        | 0.0030              | 2.7E-01           | 7.5E-04            |                 |
| A           | St. Marys River         | 9.9E+04        | 0.0073              | 7.3E-01           | 2.0E-03            |                 |
| E           | St. Marys River         | 3.2E+04        | 0.0030              | 9.7E-02           | 2.6E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.1E+00 3.0E-03 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0142              | 3.7E-03           | 1.0E-05            |                 |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 1.2E+00           | 3.4E-03            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0033              | 3.2E-03           | 8.9E-06            |                 |
|             | TOTAL                   |                |                     |                   |                    | 3.2E-03 8.9E-06 |
| D           | Bennett Creek           | 8.2E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 4.9E+03        | 0.0030              | 1.5E-02           | 4.0E-05            |                 |
| A           | St. Marys River         | 1.3E+04        | 0.0073              | 9.8E-02           | 2.7E-04            |                 |
| E           | St. Marys River         | 9.7E+02        | 0.0030              | 2.9E-03           | 8.0E-06            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.2E-01 3.2E-04 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0142              | 2.0E-04           | 5.5E-07            |                 |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 1.2E-01           | 3.3E-04            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0033              | 1.2E+00           | 3.4E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.2E+00 3.4E-03 |
| D           | Bennett Creek           | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| C           | St. Marys River         | 6.3E+05        | 0.0030              | 1.9E+00           | 5.2E-03            |                 |
| A           | St. Marys River         | 5.3E+05        | 0.0073              | 3.9E+00           | 1.1E-02            |                 |
| E           | St. Marys River         | 2.9E+05        | 0.0030              | 8.8E-01           | 2.4E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 6.6E+00 1.8E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0142              | 1.2E-01           | 3.2E-04            |                 |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | 0.0000                  |                |                     |                   |                    |                 |

## Appendix 9: Mass Flux Estimates - Metals

### MOLYBDENUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0050              | 6.5E-01           | 1.8E-03            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0200              | 7.6E-01           | 2.1E-03            |         |
|             | TOTAL                   |                |                     |                   | 1.4E+00            | 3.9E-03 |
| D           | Bennett Creek           | 3.8E+04        | 0.0013              | 4.8E-02           | 1.3E-04            |         |
| C           | St. Marys River         | 9.1E+04        | 0.0150              | 1.4E+00           | 3.7E-03            |         |
| A           | St. Marys River         | 9.9E+04        | 0.0310              | 3.1E+00           | 8.4E-03            |         |
| E           | St. Marys River         | 3.2E+04        | 0.0150              | 4.8E-01           | 1.3E-03            |         |
|             | TOTAL                   |                |                     |                   | 5.0E+00            | 1.3E-02 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0263              | 6.8E-03           | 1.9E-05            |         |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | Total                   |                |                     | 6.4E+00           | 1.7E-02            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0050              | 2.0E-02           | 5.4E-05            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0200              | 1.9E-02           | 5.3E-05            |         |
|             | TOTAL                   |                |                     |                   | 3.9E-02            | 1.1E-04 |
| D           | Bennett Creek           | 8.2E+02        | 0.0013              | 1.0E-03           | 2.8E-06            |         |
| C           | St. Marys River         | 4.9E+03        | 0.0150              | 7.3E-02           | 2.0E-04            |         |
| A           | St. Marys River         | 1.3E+04        | 0.0310              | 4.1E-01           | 1.1E-03            |         |
| E           | St. Marys River         | 9.7E+02        | 0.0150              | 1.4E-02           | 4.0E-05            |         |
|             | TOTAL                   |                |                     |                   | 5.0E-01            | 1.4E-03 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0263              | 3.7E-04           | 1.0E-06            |         |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | Total                   |                |                     | 5.4E-01           | 1.5E-03            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0050              | 4.8E+00           | 1.3E-02            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0200              | 7.4E+00           | 2.0E-02            |         |
|             | TOTAL                   |                |                     |                   | 1.2E+01            | 3.3E-02 |
| D           | Bennett Creek           | 3.6E+05        | 0.0013              | 4.5E-01           | 1.2E-03            |         |
| C           | St. Marys River         | 6.3E+05        | 0.0150              | 9.4E+00           | 2.6E-02            |         |
| A           | St. Marys River         | 5.3E+05        | 0.0310              | 1.6E+01           | 4.5E-02            |         |
| E           | St. Marys River         | 2.9E+05        | 0.0150              | 4.3E+00           | 1.2E-02            |         |
|             | TOTAL                   |                |                     |                   | 3.1E+01            | 8.3E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0263              | 2.1E-01           | 5.9E-04            |         |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |         |
|             | Total                   |                |                     | 4.3E+01           | 1.2E-01            |         |

## Appendix 9: Mass Flux Estimates - Metals

### CALCIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 30.8500             | 4.0E+03           | 1.1E+01            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 101.2500            | 3.8E+03           | 1.1E+01            |                 |
|             | TOTAL                   |                |                     |                   |                    | 7.9E+03 2.2E+01 |
| D           | Bennett Creek           | 3.8E+04        | 45.2667             | 1.7E+03           | 4.7E+00            |                 |
| C           | St. Marys River         | 9.1E+04        | 214.8408            | 2.0E+04           | 5.4E+01            |                 |
| A           | St. Marys River         | 9.9E+04        | 304.8500            | 3.0E+04           | 8.3E+01            |                 |
| E           | St. Marys River         | 3.2E+04        | 214.8408            | 6.9E+03           | 1.9E+01            |                 |
|             | TOTAL                   |                |                     |                   |                    | 5.8E+04 1.6E+02 |
| B           | West Davignon Diversion | 2.6E+02        | 370.0000            | 9.6E+01           | 2.6E-01            |                 |
| F           | Spring Creek            | 3.6E+04        | 37.7500             | 1.4E+03           | 3.7E+00            |                 |
|             | Total                   |                |                     | 6.8E+04           | 1.9E+02            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 30.8500             | 1.2E+02           | 3.3E-01            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 101.2500            | 9.8E+01           | 2.7E-01            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.2E+02 6.0E-01 |
| D           | Bennett Creek           | 8.2E+02        | 45.2667             | 3.7E+01           | 1.0E-01            |                 |
| C           | St. Marys River         | 4.9E+03        | 214.8408            | 1.0E+03           | 2.9E+00            |                 |
| A           | St. Marys River         | 1.3E+04        | 304.8500            | 4.1E+03           | 1.1E+01            |                 |
| E           | St. Marys River         | 9.7E+02        | 214.8408            | 2.1E+02           | 5.7E-01            |                 |
|             | TOTAL                   |                |                     |                   |                    | 5.4E+03 1.5E+01 |
| B           | West Davignon Diversion | 1.4E+01        | 370.0000            | 5.2E+00           | 1.4E-02            |                 |
| F           | Spring Creek            | 3.5E+02        | 37.7500             | 1.3E+01           | 3.6E-02            |                 |
|             | Total                   |                |                     | 5.6E+03           | 1.5E+01            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 30.8500             | 2.9E+04           | 8.0E+01            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 101.2500            | 3.7E+04           | 1.0E+02            |                 |
|             | TOTAL                   |                |                     |                   |                    | 6.7E+04 1.8E+02 |
| D           | Bennett Creek           | 3.6E+05        | 45.2667             | 1.6E+04           | 4.5E+01            |                 |
| C           | St. Marys River         | 6.3E+05        | 214.8408            | 1.4E+05           | 3.7E+02            |                 |
| A           | St. Marys River         | 5.3E+05        | 304.8500            | 1.6E+05           | 4.4E+02            |                 |
| E           | St. Marys River         | 2.9E+05        | 214.8408            | 6.2E+04           | 1.7E+02            |                 |
|             | TOTAL                   |                |                     |                   |                    | 3.7E+05 9.8E+02 |
| B           | West Davignon Diversion | 8.1E+03        | 370.0000            | 3.0E+03           | 8.3E+00            |                 |
| F           | Spring Creek            | 3.6E+05        | 37.7500             | 1.4E+04           | 3.7E+01            |                 |
|             | Total                   |                |                     | 4.6E+05           | 1.3E+03            |                 |

## Appendix 9: Mass Flux Estimates - Metals

### VANADIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0233              | 8.9E-01           | 2.4E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 8.9E-01 2.4E-03 |
| D           | Bennett Creek           | 3.8E+04        | 0.0075              | 2.9E-01           | 7.8E-04            |                 |
| C           | St. Marys River         | 9.1E+04        | 0.0222              | 2.0E+00           | 5.5E-03            |                 |
| A           | St. Marys River         | 9.9E+04        | 0.0444              | 4.4E+00           | 1.2E-02            |                 |
| E           | St. Marys River         | 3.2E+04        | 0.0222              | 7.1E-01           | 1.9E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 7.4E+00 2.0E-02 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0388              | 1.0E-02           | 2.8E-05            |                 |
| F           | Spring Creek            | 3.6E+04        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 8.3E+00           | 2.3E-02            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0233              | 2.3E-02           | 6.2E-05            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.3E-02 6.2E-05 |
| D           | Bennett Creek           | 8.2E+02        | 0.0075              | 6.1E-03           | 1.7E-05            |                 |
| C           | St. Marys River         | 4.9E+03        | 0.0222              | 1.1E-01           | 3.0E-04            |                 |
| A           | St. Marys River         | 1.3E+04        | 0.0444              | 5.9E-01           | 1.6E-03            |                 |
| E           | St. Marys River         | 9.7E+02        | 0.0222              | 2.1E-02           | 5.9E-05            |                 |
|             | TOTAL                   |                |                     |                   |                    | 7.3E-01 2.0E-03 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0388              | 5.4E-04           | 1.5E-06            |                 |
| F           | Spring Creek            | 3.5E+02        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
|             | Total                   |                |                     | 7.5E-01           | 2.1E-03            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0000              | 0.0E+00           | 0.0E+00            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0233              | 1.5E+01           | 4.0E-02            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.5E+01 4.0E-02 |
| D           | Bennett Creek           | 3.6E+05        | 0.0075              | 2.2E+00           | 6.0E-03            |                 |
| C           | St. Marys River         | 6.3E+05        | 0.0222              | 0.0E+00           | 0.0E+00            |                 |
| A           | St. Marys River         | 5.3E+05        | 0.0444              | 3.6E-01           | 9.9E-04            |                 |
| E           | St. Marys River         | 2.9E+05        | 0.0222              | 8.0E+00           | 2.2E-02            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.1E+01 2.3E-02 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0388              | ERR               | ERR                |                 |
| F           | Spring Creek            | 3.6E+05        | 0.0000              | ERR               | ERR                |                 |
|             | Total                   |                |                     | ERR               | ERR                |                 |

## Appendix 9: Mass Flux Estimates - Metals

### ALUMINUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) |         | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|---------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0600              | 7.8E+00           |         | 2.1E-02            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.5600              | 2.1E+01           |         | 5.8E-02            |         |
|             | TOTAL                   |                |                     |                   | 2.9E+01 |                    | 8.0E-02 |
| D           | Bennett Creek           | 3.8E+04        | 0.2000              | 7.6E+00           |         | 2.1E-02            |         |
| C           | St. Marys River         | 9.1E+04        | 0.3897              | 3.5E+01           |         | 9.7E-02            |         |
| A           | St. Marys River         | 9.9E+04        | 0.4078              | 4.0E+01           |         | 1.1E-01            |         |
| E           | St. Marys River         | 3.2E+04        | 0.3897              | 1.2E+01           |         | 3.4E-02            |         |
|             | TOTAL                   |                |                     |                   | 9.6E+01 |                    | 2.4E-01 |
| B           | West Davignon Diversion | 2.6E+02        | 0.3900              | 1.0E-01           |         | 2.8E-04            |         |
| F           | Spring Creek            | 3.6E+04        | 0.1400              | 5.0E+00           |         | 1.4E-02            |         |
|             | Total                   |                |                     | 1.3E+02           |         | 3.6E-01            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) |         | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|---------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0600              | 2.3E-01           |         | 6.4E-04            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.5600              | 5.4E-01           |         | 1.5E-03            |         |
|             | TOTAL                   |                |                     |                   | 7.8E-01 |                    | 2.1E-03 |
| D           | Bennett Creek           | 8.2E+02        | 0.2000              | 1.6E-01           |         | 4.5E-04            |         |
| C           | St. Marys River         | 4.9E+03        | 0.3897              | 1.9E+00           |         | 5.2E-03            |         |
| A           | St. Marys River         | 1.3E+04        | 0.4078              | 5.4E+00           |         | 1.5E-02            |         |
| E           | St. Marys River         | 9.7E+02        | 0.3897              | 3.8E-01           |         | 1.0E-03            |         |
|             | TOTAL                   |                |                     |                   | 7.9E+00 |                    | 2.1E-02 |
| B           | West Davignon Diversion | 1.4E+01        | 0.3900              | 5.5E-03           |         | 1.5E-05            |         |
| F           | Spring Creek            | 3.5E+02        | 0.1400              | 4.9E-02           |         | 1.3E-04            |         |
|             | Total                   |                |                     | 8.7E+00           |         | 2.4E-02            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) |         | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|---------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0600              | 5.7E+01           |         | 1.6E-01            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.5600              | 2.1E+02           |         | 5.7E-01            |         |
|             | TOTAL                   |                |                     |                   | 2.6E+02 |                    | 7.2E-01 |
| D           | Bennett Creek           | 3.6E+05        | 0.2000              | 7.2E+01           |         | 2.0E-01            |         |
| C           | St. Marys River         | 6.3E+05        | 0.3897              | 2.5E+02           |         | 6.7E-01            |         |
| A           | St. Marys River         | 5.3E+05        | 0.4078              | 2.2E+02           |         | 5.9E-01            |         |
| E           | St. Marys River         | 2.9E+05        | 0.3897              | 1.1E+02           |         | 3.1E-01            |         |
|             | TOTAL                   |                |                     |                   | 6.5E+02 |                    | 1.6E+00 |
| B           | West Davignon Diversion | 8.1E+03        | 0.3900              | 3.2E+00           |         | 8.7E-03            |         |
| F           | Spring Creek            | 3.6E+05        | 0.1400              | 5.0E+01           |         | 1.4E-01            |         |
|             | Total                   |                |                     | 9.6E+02           |         | 2.6E+00            |         |

## Appendix 9: Mass Flux Estimates - Metals

### MAGNESIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 6.9250              | 9.0E+02           | 2.5E+00            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 2.0500              | 7.8E+01           | 2.1E-01            |         |
|             | TOTAL                   |                |                     | 9.8E+02           |                    | 2.7E+00 |
| D           | Bennett Creek           | 3.8E+04        | 7.1042              | 2.7E+02           | 7.4E-01            |         |
| C           | St. Marys River         | 9.1E+04        | 2.5356              | 2.3E+02           | 6.3E-01            |         |
| A           | St. Marys River         | 9.9E+04        | 5.8771              | 5.8E+02           | 1.6E+00            |         |
| E           | St. Marys River         | 3.2E+04        | 2.5356              | 8.1E+01           | 2.2E-01            |         |
|             | TOTAL                   |                |                     | 1.2E+03           |                    | 2.4E+00 |
| B           | West Davignon Diversion | 2.6E+02        | 93.2500             | 2.4E+01           | 6.6E-02            |         |
| F           | Spring Creek            | 3.6E+04        | 1.8125              | 6.5E+01           | 1.8E-01            |         |
|             | Total                   |                |                     | 2.2E+03           | 6.1E+00            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 6.9250              | 2.7E+01           | 7.4E-02            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 2.0500              | 2.0E+00           | 5.5E-03            |         |
|             | TOTAL                   |                |                     | 2.9E+01           |                    | 8.0E-02 |
| D           | Bennett Creek           | 8.2E+02        | 7.1042              | 5.8E+00           | 1.6E-02            |         |
| C           | St. Marys River         | 4.9E+03        | 2.5356              | 1.2E+01           | 3.4E-02            |         |
| A           | St. Marys River         | 1.3E+04        | 5.8771              | 7.8E+01           | 2.1E-01            |         |
| E           | St. Marys River         | 9.7E+02        | 2.5356              | 2.4E+00           | 6.7E-03            |         |
|             | TOTAL                   |                |                     | 9.9E+01           |                    | 2.6E-01 |
| B           | West Davignon Diversion | 1.4E+01        | 93.2500             | 1.3E+00           | 3.6E-03            |         |
| F           | Spring Creek            | 3.5E+02        | 1.8125              | 6.3E-01           | 1.7E-03            |         |
|             | Total                   |                |                     | 1.3E+02           | 3.6E-01            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 6.9250              | 6.6E+03           | 1.8E+01            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 2.0500              | 7.6E+02           | 2.1E+00            |         |
|             | TOTAL                   |                |                     | 7.3E+03           |                    | 2.0E+01 |
| D           | Bennett Creek           | 3.6E+05        | 7.1042              | 2.6E+03           | 7.0E+00            |         |
| C           | St. Marys River         | 6.3E+05        | 2.5356              | 1.6E+03           | 4.4E+00            |         |
| A           | St. Marys River         | 5.3E+05        | 5.8771              | 3.1E+03           | 8.5E+00            |         |
| E           | St. Marys River         | 2.9E+05        | 2.5356              | 7.4E+02           | 2.0E+00            |         |
|             | TOTAL                   |                |                     | 8.0E+03           |                    | 1.5E+01 |
| B           | West Davignon Diversion | 8.1E+03        | 93.2500             | 7.6E+02           | 2.1E+00            |         |
| F           | Spring Creek            | 3.6E+05        | 1.8125              | 6.5E+02           | 1.8E+00            |         |
|             | Total                   |                |                     | 1.7E+04           | 4.6E+01            |         |



## Appendix 9: Mass Flux Estimates - Metals

### BARIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.0150              | 2.0E+00           | 5.3E-03            |         |         |
| D           | Baseline Road ditch     | 3.8E+04        | 0.0467              | 1.8E+00           | 4.9E-03            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 3.7E+00 | 1.0E-02 |
| D           | Bennett Creek           | 3.8E+04        | 0.0338              | 1.3E+00           | 3.5E-03            |         |         |
| C           | St. Marys River         | 9.1E+04        | 0.2476              | 2.3E+01           | 6.2E-02            |         |         |
| A           | St. Marys River         | 9.9E+04        | 0.0915              | 9.1E+00           | 2.5E-02            |         |         |
| E           | St. Marys River         | 3.2E+04        | 0.2476              | 7.9E+00           | 2.2E-02            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 4.1E+01 | 1.1E-01 |
| B           | West Davignon Diversion | 2.6E+02        | 0.0813              | 2.1E-02           | 5.8E-05            |         |         |
| F           | Spring Creek            | 3.6E+04        | 0.0500              | 1.8E+00           | 4.9E-03            |         |         |
|             | Total                   |                |                     | 4.6E+01           | 1.3E-01            |         |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.0150              | 5.9E-02           | 1.6E-04            |         |         |
| D           | Baseline Road ditch     | 9.7E+02        | 0.0467              | 4.5E-02           | 1.2E-04            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 1.0E-01 | 2.8E-04 |
| D           | Bennett Creek           | 8.2E+02        | 0.0338              | 2.8E-02           | 7.6E-05            |         |         |
| C           | St. Marys River         | 4.9E+03        | 0.2476              | 1.2E+00           | 3.3E-03            |         |         |
| A           | St. Marys River         | 1.3E+04        | 0.0915              | 1.2E+00           | 3.3E-03            |         |         |
| E           | St. Marys River         | 9.7E+02        | 0.2476              | 2.4E-01           | 6.6E-04            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 2.7E+00 | 7.3E-03 |
| B           | West Davignon Diversion | 1.4E+01        | 0.0813              | 1.1E-03           | 3.1E-06            |         |         |
| F           | Spring Creek            | 3.5E+02        | 0.0500              | 1.8E-02           | 4.8E-05            |         |         |
|             | Total                   |                |                     | 2.8E+00           | 7.7E-03            |         |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.0150              | 1.4E+01           | 3.9E-02            |         |         |
| D           | Baseline Road ditch     | 3.7E+05        | 0.0467              | 1.7E+01           | 4.7E-02            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 3.2E+01 | 8.6E-02 |
| D           | Bennett Creek           | 3.6E+05        | 0.0338              | 1.2E+01           | 3.3E-02            |         |         |
| C           | St. Marys River         | 6.3E+05        | 0.2476              | 1.6E+02           | 4.3E-01            |         |         |
| A           | St. Marys River         | 5.3E+05        | 0.0915              | 4.8E+01           | 1.3E-01            |         |         |
| E           | St. Marys River         | 2.9E+05        | 0.2476              | 7.2E+01           | 2.0E-01            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 2.9E+02 | 7.6E-01 |
| B           | West Davignon Diversion | 8.1E+03        | 0.0813              | 6.6E-01           | 1.8E-03            |         |         |
| F           | Spring Creek            | 3.6E+05        | 0.0500              | 1.8E+01           | 4.9E-02            |         |         |
|             | Total                   |                |                     | 3.4E+02           | 9.3E-01            |         |         |

## Appendix 9: Mass Flux Estimates - Metals

### POTASSIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) |         | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|---------|--------------------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 3.5500              | 4.6E+02           |         | 1.3E+00            |         |
| D           | Baseline Road ditch     | 3.8E+04        | 9.7000              | 3.7E+02           |         | 1.0E+00            |         |
|             | TOTAL                   |                |                     |                   | 8.3E+02 |                    | 2.3E+00 |
| D           | Bennett Creek           | 3.8E+04        | 1.8000              | 6.8E+01           |         | 1.9E-01            |         |
| C           | St. Marys River         | 9.1E+04        | 49.1350             | 4.5E+03           |         | 1.2E+01            |         |
| A           | St. Marys River         | 9.9E+04        | 197.6417            | 2.0E+04           |         | 5.4E+01            |         |
| E           | St. Marys River         | 3.2E+04        | 49.1350             | 1.6E+03           |         | 4.3E+00            |         |
|             | TOTAL                   |                |                     |                   | 2.6E+04 |                    | 7.0E+01 |
| B           | West Davignon Diversion | 2.6E+02        | 207.0000            | 5.4E+01           |         | 1.5E-01            |         |
| F           | Spring Creek            | 3.6E+04        | 5.4250              | 2.0E+02           |         | 5.4E-01            |         |
|             | Total                   |                |                     | 2.7E+04           |         | 7.3E+01            |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) |         | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|---------|--------------------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 3.5500              | 1.4E+01           |         | 3.8E-02            |         |
| D           | Baseline Road ditch     | 9.7E+02        | 9.7000              | 9.4E+00           |         | 2.6E-02            |         |
|             | TOTAL                   |                |                     |                   | 2.3E+01 |                    | 6.4E-02 |
| D           | Bennett Creek           | 8.2E+02        | 1.8000              | 1.5E+00           |         | 4.0E-03            |         |
| C           | St. Marys River         | 4.9E+03        | 49.1350             | 2.4E+02           |         | 6.6E-01            |         |
| A           | St. Marys River         | 1.3E+04        | 197.6417            | 2.6E+03           |         | 7.2E+00            |         |
| E           | St. Marys River         | 9.7E+02        | 49.1350             | 4.7E+01           |         | 1.3E-01            |         |
|             | TOTAL                   |                |                     |                   | 2.9E+03 |                    | 8.0E+00 |
| B           | West Davignon Diversion | 1.4E+01        | 207.0000            | 2.9E+00           |         | 8.0E-03            |         |
| F           | Spring Creek            | 3.5E+02        | 5.4250              | 1.9E+00           |         | 5.2E-03            |         |
|             | Total                   |                |                     | 3.0E+03           |         | 8.1E+00            |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) |         | Mass Flux (kg/day) |         |
|-------------|-------------------------|----------------|---------------------|-------------------|---------|--------------------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 3.5500              | 3.4E+03           |         | 9.2E+00            |         |
| D           | Baseline Road ditch     | 3.7E+05        | 9.7000              | 3.6E+03           |         | 9.8E+00            |         |
|             | TOTAL                   |                |                     |                   | 7.0E+03 |                    | 1.9E+01 |
| D           | Bennett Creek           | 3.6E+05        | 1.8000              | 6.5E+02           |         | 1.8E+00            |         |
| C           | St. Marys River         | 6.3E+05        | 49.1350             | 3.1E+04           |         | 8.5E+01            |         |
| A           | St. Marys River         | 5.3E+05        | 197.6417            | 1.0E+05           |         | 2.9E+02            |         |
| E           | St. Marys River         | 2.9E+05        | 49.1350             | 1.4E+04           |         | 3.9E+01            |         |
|             | TOTAL                   |                |                     |                   | 1.5E+05 |                    | 4.1E+02 |
| B           | West Davignon Diversion | 8.1E+03        | 207.0000            | 1.7E+03           |         | 4.6E+00            |         |
| F           | Spring Creek            | 3.6E+05        | 5.4250              | 2.0E+03           |         | 5.4E+00            |         |
|             | Total                   |                |                     | 1.6E+05           |         | 4.4E+02            |         |

## Appendix 9: Mass Flux Estimates - Metals

### STRONTIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 1.3E+05        | 0.2250              | 2.9E+01           | 8.0E-02            |                 |
| D           | Baseline Road ditch     | 3.8E+04        | 0.3200              | 1.2E+01           | 3.3E-02            |                 |
|             | TOTAL                   |                |                     |                   |                    | 4.1E+01 1.1E-01 |
| D           | Bennett Creek           | 3.8E+04        | 0.1725              | 6.6E+00           | 1.8E-02            |                 |
| C           | St. Marys River         | 9.1E+04        | 0.8341              | 7.6E+01           | 2.1E-01            |                 |
| A           | St. Marys River         | 9.9E+04        | 1.1988              | 1.2E+02           | 3.3E-01            |                 |
| E           | St. Marys River         | 3.2E+04        | 0.8341              | 2.7E+01           | 7.3E-02            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.3E+02 6.1E-01 |
| B           | West Davignon Diversion | 2.6E+02        | 1.3288              | 3.5E-01           | 9.5E-04            |                 |
| F           | Spring Creek            | 3.6E+04        | 0.0800              | 2.9E+00           | 7.9E-03            |                 |
|             | Total                   |                |                     | 2.7E+02           | 7.5E-01            |                 |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 3.9E+03        | 0.2250              | 8.8E-01           | 2.4E-03            |                 |
| D           | Baseline Road ditch     | 9.7E+02        | 0.3200              | 3.1E-01           | 8.5E-04            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.2E+00 3.3E-03 |
| D           | Bennett Creek           | 8.2E+02        | 0.1725              | 1.4E-01           | 3.9E-04            |                 |
| C           | St. Marys River         | 4.9E+03        | 0.8341              | 4.1E+00           | 1.1E-02            |                 |
| A           | St. Marys River         | 1.3E+04        | 1.1988              | 1.6E+01           | 4.4E-02            |                 |
| E           | St. Marys River         | 9.7E+02        | 0.8341              | 8.1E-01           | 2.2E-03            |                 |
|             | TOTAL                   |                |                     |                   |                    | 2.1E+01 5.7E-02 |
| B           | West Davignon Diversion | 1.4E+01        | 1.3288              | 1.9E-02           | 5.1E-05            |                 |
| F           | Spring Creek            | 3.5E+02        | 0.0800              | 2.8E-02           | 7.7E-05            |                 |
|             | Total                   |                |                     | 2.2E+01           | 6.1E-02            |                 |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |                 |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|-----------------|
| C           | Baseline Road ditch     | 9.5E+05        | 0.2250              | 2.1E+02           | 5.9E-01            |                 |
| D           | Baseline Road ditch     | 3.7E+05        | 0.3200              | 1.2E+02           | 3.2E-01            |                 |
|             | TOTAL                   |                |                     |                   |                    | 3.3E+02 9.1E-01 |
| D           | Bennett Creek           | 3.6E+05        | 0.1725              | 6.2E+01           | 1.7E-01            |                 |
| C           | St. Marys River         | 6.3E+05        | 0.8341              | 5.3E+02           | 1.4E+00            |                 |
| A           | St. Marys River         | 5.3E+05        | 1.1988              | 6.3E+02           | 1.7E+00            |                 |
| E           | St. Marys River         | 2.9E+05        | 0.8341              | 2.4E+02           | 6.6E-01            |                 |
|             | TOTAL                   |                |                     |                   |                    | 1.5E+03 3.8E+00 |
| B           | West Davignon Diversion | 8.1E+03        | 1.3288              | 1.1E+01           | 3.0E-02            |                 |
| F           | Spring Creek            | 3.6E+05        | 0.0800              | 2.9E+01           | 7.9E-02            |                 |
|             | Total                   |                |                     | 1.8E+03           | 5.0E+00            |                 |

## Appendix 9: Mass Flux Estimates - Metals

### SODIUM

#### Average Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|---------|
| C           | Baseline Road ditch     | 1.3E+05        | 18.2500             | 2.4E+03           | 6.5E+00            |         |         |
| D           | Baseline Road ditch     | 3.8E+04        | 61.2500             | 2.3E+03           | 6.4E+00            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 4.7E+03 | 1.3E+01 |
| D           | Bennett Creek           | 3.8E+04        | 12.1250             | 4.6E+02           | 1.3E+00            |         |         |
| C           | St. Marys River         | 9.1E+04        | 43.4521             | 4.0E+03           | 1.1E+01            |         |         |
| A           | St. Marys River         | 9.9E+04        | 71.7000             | 7.1E+03           | 1.9E+01            |         |         |
| E           | St. Marys River         | 3.2E+04        | 43.4521             | 1.4E+03           | 3.8E+00            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 1.3E+04 | 3.4E+01 |
| B           | West Davignon Diversion | 2.6E+02        | 153.5000            | 4.0E+01           | 1.1E-01            |         |         |
| F           | Spring Creek            | 3.6E+04        | 14.8750             | 5.4E+02           | 1.5E+00            |         |         |
|             | Total                   |                |                     | 1.8E+04           | 5.0E+01            |         |         |

#### Minimum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|---------|
| C           | Baseline Road ditch     | 3.9E+03        | 18.2500             | 7.1E+01           | 2.0E-01            |         |         |
| D           | Baseline Road ditch     | 9.7E+02        | 61.2500             | 5.9E+01           | 1.6E-01            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 1.3E+02 | 3.6E-01 |
| D           | Bennett Creek           | 8.2E+02        | 12.1250             | 9.9E+00           | 2.7E-02            |         |         |
| C           | St. Marys River         | 4.9E+03        | 43.4521             | 2.1E+02           | 5.8E-01            |         |         |
| A           | St. Marys River         | 1.3E+04        | 71.7000             | 9.6E+02           | 2.6E+00            |         |         |
| E           | St. Marys River         | 9.7E+02        | 43.4521             | 4.2E+01           | 1.1E-01            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 1.2E+03 | 3.3E+00 |
| B           | West Davignon Diversion | 1.4E+01        | 153.5000            | 2.2E+00           | 5.9E-03            |         |         |
| F           | Spring Creek            | 3.5E+02        | 14.8750             | 5.2E+00           | 1.4E-02            |         |         |
|             | Total                   |                |                     | 1.4E+03           | 3.7E+00            |         |         |

#### Maximum Flux

| Element No. | Discharge to            | Flux,q (M3/yr) | Weighted Avg. conc. | Mass Flux (Kg/yr) | Mass Flux (kg/day) |         |         |
|-------------|-------------------------|----------------|---------------------|-------------------|--------------------|---------|---------|
| C           | Baseline Road ditch     | 9.5E+05        | 18.2500             | 1.7E+04           | 4.8E+01            |         |         |
| D           | Baseline Road ditch     | 3.7E+05        | 61.2500             | 2.3E+04           | 6.2E+01            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 4.0E+04 | 1.1E+02 |
| D           | Bennett Creek           | 3.6E+05        | 12.1250             | 4.4E+03           | 1.2E+01            |         |         |
| C           | St. Marys River         | 6.3E+05        | 43.4521             | 2.7E+04           | 7.5E+01            |         |         |
| A           | St. Marys River         | 5.3E+05        | 71.7000             | 3.8E+04           | 1.0E+02            |         |         |
| E           | St. Marys River         | 2.9E+05        | 43.4521             | 1.3E+04           | 3.5E+01            |         |         |
|             | TOTAL                   |                |                     |                   |                    | 8.2E+04 | 2.1E+02 |
| B           | West Davignon Diversion | 8.1E+03        | 153.5000            | 1.3E+03           | 3.4E+00            |         |         |
| F           | Spring Creek            | 3.6E+05        | 14.8750             | 5.4E+03           | 1.5E+01            |         |         |
|             | Total                   | 0.0000         |                     | 1.3E+05           | 3.5E+02            |         |         |

**APPENDIX 10**

**SURFACE WATER FLOW DATA**

## TOTAL DAILY DISCHARGE - STATION SW1

| Day   | Aug   | Sept  | 1988<br>Oct | Nov    | Dec   | 1989<br>Jan | Feb   | Mar    | 1989<br>Apr | May   | June  | July   | Day   |
|-------|-------|-------|-------------|--------|-------|-------------|-------|--------|-------------|-------|-------|--------|-------|
| 1     | 0.002 | 0.055 | 0.379       | 1.417  | 0.854 | 0.132       | 0.062 | 0.039  | 5.58        | 0.736 | 0.129 | 0.0078 | 1     |
| 2     | 0.003 | 0.037 | 1.308       | 1.374  | 0.651 | 0.128       | 0.060 | 0.038  | 5.3         | 0.556 | 0.126 | 0.0064 | 2     |
| 3     | 0.004 | 0.028 | 1.038       | 1.053  | 0.532 | 0.126       | 0.059 | 0.038  | 5.2         | 0.422 | 0.110 | 0.0055 | 3     |
| 4     | 0.003 | 0.050 | 0.993       | 1.046  | 0.417 | 0.125       | 0.057 | 0.037  | 5.02        | 0.327 | 0.080 | 0.0049 | 4     |
| 5     | 0.005 | 0.042 | 0.750       | 9.77   | 0.337 | 0.121       | 0.056 | 0.036  | 4.96        | 0.302 | 0.061 | 0.0043 | 5     |
| 6     | 0.006 | 0.039 | 0.434       | 13.3   | 0.291 | 0.119       | 0.054 | 0.035  | 4.83        | 0.298 | 0.052 | 0.0039 | 6     |
| 7     | 0.005 | 0.027 | 0.293       | 4.64   | 0.236 | 0.120       | 0.053 | 0.034  | 4.65        | 0.236 | 0.045 | 0.0036 | 7     |
| 8     | 0.005 | 0.021 | 0.238       | 1.882  | 0.199 | 0.120       | 0.051 | 0.034  | 4.33        | 0.195 | 0.052 | 0.0033 | 8     |
| 9     | 0.004 | 0.019 | 0.191       | 1.259  | 0.184 | 0.115       | 0.050 | 0.034  | 2.526       | 0.157 | 0.128 | 0.0030 | 9     |
| 10    | 0.003 | 0.015 | 0.526       | 1.349  | 0.172 | 0.112       | 0.049 | 0.033  | 1.780       | 0.133 | 0.102 | 0.0026 | 10    |
| 11    | 0.002 | 0.010 | 0.833       | 1.581  | 0.172 | 0.107       | 0.048 | 0.033  | 1.226       | 0.113 | 0.068 | 0.0023 | 11    |
| 12    | 0.002 | 0.011 | 0.638       | 1.061  | 0.172 | 0.104       | 0.046 | 0.032  | 0.948       | 0.094 | 0.048 | 0.0021 | 12    |
| 13    | 0.007 | 0.026 | 0.508       | 1.698  | 0.172 | 0.100       | 0.046 | 0.031  | 1.316       | 0.086 | 0.044 | 0.0017 | 13    |
| 14    | 0.178 | 0.020 | 0.434       | 1.798  | 0.158 | 0.097       | 0.044 | 0.031  | 1.608       | 0.080 | 0.040 | 0.0014 | 14    |
| 15    | 0.185 | 0.015 | 0.363       | 1.564  | 0.156 | 0.093       | 0.044 | 0.031  | 2.464       | 0.073 | 0.064 | 0.0012 | 15    |
| 16    | 0.084 | 0.012 | 0.368       | 2.341  | 0.140 | 0.091       | 0.043 | 0.030  | 4.22        | 0.065 | 0.109 | 0.0012 | 16    |
| 17    | 0.363 | 0.011 | 1.146       | 2.201  | 0.128 | 0.086       | 0.042 | 0.030  | 5.49        | 0.057 | 0.146 | 0.0012 | 17    |
| 18    | 0.249 | 0.013 | 1.494       | 1.383  | 0.119 | 0.085       | 0.041 | 0.029  | 4.73        | 0.050 | 0.134 | 0.0012 | 18    |
| 19    | 0.082 | 0.022 | 1.139       | 0.970  | 0.130 | 0.081       | 0.041 | 0.029  | 2.977       | 0.049 | 0.082 | 0.0012 | 19    |
| 20    | 0.039 | 0.353 | 0.812       | 1.267  | 0.148 | 0.080       | 0.039 | 0.028  | 2.792       | 0.075 | 0.054 | 0.0010 | 20    |
| 21    | 0.022 | 0.347 | 0.651       | 1.194  | 0.133 | 0.079       | 0.039 | 0.028  | 2.879       | 0.379 | 0.039 | 0.0008 | 21    |
| 22    | 0.013 | 0.183 | 0.619       | 0.883  | 0.148 | 0.077       | 0.039 | 0.028  | 2.922       | 0.272 | 0.032 | 0.0008 | 22    |
| 23    | 0.010 | 0.171 | 0.550       | 0.703  | 0.162 | 0.075       | 0.039 | 0.028  | 2.464       | 0.158 | 0.035 | 0.0007 | 23    |
| 24    | 0.016 | 0.114 | 1.038       | 0.593  | 0.164 | 0.073       | 0.039 | 0.029  | 2.211       | 0.106 | 0.037 | 0.0007 | 24    |
| 25    | 0.082 | 0.068 | 2.025       | 0.520  | 0.159 | 0.070       | 0.039 | 0.029  | 2.759       | 0.313 | 0.027 | 0.0007 | 25    |
| 26    | 0.150 | 0.085 | 2.824       | 0.763  | 0.156 | 0.069       | 0.039 | 0.031  | 4.59        | 0.283 | 0.021 | 0.0008 | 26    |
| 27    | 0.142 | 0.266 | 2.083       | 8.67   | 0.151 | 0.068       | 0.039 | 0.038  | 2.879       | 0.167 | 0.019 | 0.0010 | 27    |
| 28    | 1.537 | 0.169 | 2.392       | 5.91   | 0.146 | 0.067       | 0.039 | 0.241  | 1.958       | 0.116 | 0.021 | 0.0010 | 28    |
| 29    | 0.514 | 0.097 | 1.817       | 2.034  | 0.143 | 0.066       |       | 2.792  | 1.178       | 0.090 | 0.012 | 0.0008 | 29    |
| 30    | 0.180 | 0.077 | 1.186       | 1.300  | 0.137 | 0.065       |       | 7.2    | 0.890       | 0.070 | 0.010 | 0.0007 | 30    |
| 31    | 0.095 |       | 0.911       |        | 0.133 | 0.065       |       | 6.3    |             | 0.106 |       | 0.0007 | 31    |
| TOTAL | 3.995 | 2.403 | 29.979      | 75.524 | 7.001 | 2.917       | 1.298 | 17.407 | 96.677      | 6.164 | 1.928 | 0.068  | TOTAL |
| MEAN  | 0.129 | 0.080 | 0.967       | 2.517  | 0.226 | 0.094       | 0.046 | 0.562  | 3.223       | 0.199 | 0.064 | 0.002  | MEAN  |
| ST.D. | 0.283 | 0.095 | 0.655       | 2.964  | 0.166 | 0.072       | 0.007 | 1.700  | 1.509       | 0.159 | 0.040 | 0.002  | ST.D. |
| MAX   | 1.537 | 0.353 | 2.824       | 13.300 | 0.854 | 0.122       | 0.062 | 7.200  | 5.580       | 0.736 | 0.146 | 0.008  | MAX   |
| MIN   | 0.002 | 0.010 | 0.191       | 0.520  | 0.119 | 0.065       | 0.039 | 0.028  | 0.890       | 0.049 | 0.010 | 0.001  | MIN   |

NOTE: all values in m<sup>3</sup>/s

## TOTAL DAILY DISCHARGE - STATION SW2

| Day   | 1988  |       |        |        |       |       |       |        |        |       |       |        | Day   |
|-------|-------|-------|--------|--------|-------|-------|-------|--------|--------|-------|-------|--------|-------|
|       | Aug   | Sept  | Oct    | Nov    | Dec   | Jan   | Feb   | Mar    | Apr    | May   | June  | July   |       |
| 1     | 0.002 | 0.055 | 0.379  | 1.417  | 0.854 | 0.132 | 0.062 | 0.039  | 5.58   | 0.736 | 0.129 | 0.0078 | 1     |
| 2     | 0.003 | 0.037 | 1.308  | 1.374  | 0.651 | 0.128 | 0.060 | 0.038  | 5.3    | 0.556 | 0.126 | 0.0064 | 2     |
| 3     | 0.004 | 0.028 | 1.038  | 1.053  | 0.532 | 0.126 | 0.059 | 0.038  | 5.2    | 0.422 | 0.110 | 0.0055 | 3     |
| 4     | 0.003 | 0.050 | 0.993  | 1.046  | 0.417 | 0.125 | 0.057 | 0.037  | 5.02   | 0.327 | 0.080 | 0.0049 | 4     |
| 5     | 0.005 | 0.042 | 0.750  | 9.77   | 0.337 | 0.121 | 0.056 | 0.036  | 4.96   | 0.302 | 0.061 | 0.0043 | 5     |
| 6     | 0.006 | 0.039 | 0.434  | 13.3   | 0.291 | 0.119 | 0.054 | 0.035  | 4.83   | 0.298 | 0.052 | 0.0039 | 6     |
| 7     | 0.005 | 0.027 | 0.293  | 4.64   | 0.236 | 0.120 | 0.053 | 0.034  | 4.65   | 0.236 | 0.045 | 0.0036 | 7     |
| 8     | 0.005 | 0.021 | 0.238  | 1.882  | 0.199 | 0.120 | 0.051 | 0.034  | 4.33   | 0.195 | 0.052 | 0.0033 | 8     |
| 9     | 0.004 | 0.019 | 0.191  | 1.259  | 0.184 | 0.115 | 0.050 | 0.034  | 2.526  | 0.157 | 0.128 | 0.0030 | 9     |
| 10    | 0.003 | 0.015 | 0.526  | 1.349  | 0.172 | 0.112 | 0.049 | 0.033  | 1.780  | 0.133 | 0.102 | 0.0026 | 10    |
| 11    | 0.002 | 0.010 | 0.833  | 1.581  | 0.172 | 0.107 | 0.048 | 0.033  | 1.226  | 0.113 | 0.068 | 0.0023 | 11    |
| 12    | 0.002 | 0.011 | 0.638  | 1.061  | 0.172 | 0.104 | 0.046 | 0.032  | 0.948  | 0.094 | 0.048 | 0.0021 | 12    |
| 13    | 0.007 | 0.026 | 0.508  | 1.698  | 0.172 | 0.100 | 0.046 | 0.031  | 1.316  | 0.086 | 0.044 | 0.0017 | 13    |
| 14    | 0.178 | 0.020 | 0.434  | 1.798  | 0.158 | 0.097 | 0.044 | 0.031  | 1.608  | 0.080 | 0.040 | 0.0014 | 14    |
| 15    | 0.185 | 0.015 | 0.363  | 1.564  | 0.156 | 0.093 | 0.044 | 0.031  | 2.464  | 0.073 | 0.064 | 0.0012 | 15    |
| 16    | 0.084 | 0.012 | 0.368  | 2.341  | 0.140 | 0.091 | 0.043 | 0.030  | 4.22   | 0.065 | 0.109 | 0.0012 | 16    |
| 17    | 0.363 | 0.011 | 1.146  | 2.201  | 0.128 | 0.086 | 0.042 | 0.030  | 5.49   | 0.057 | 0.146 | 0.0012 | 17    |
| 18    | 0.249 | 0.013 | 1.494  | 1.383  | 0.119 | 0.085 | 0.041 | 0.029  | 4.73   | 0.050 | 0.134 | 0.0012 | 18    |
| 19    | 0.082 | 0.022 | 1.139  | 0.970  | 0.130 | 0.081 | 0.041 | 0.029  | 2.977  | 0.049 | 0.082 | 0.0012 | 19    |
| 20    | 0.039 | 0.353 | 0.812  | 1.267  | 0.148 | 0.080 | 0.039 | 0.028  | 2.792  | 0.075 | 0.054 | 0.0010 | 20    |
| 21    | 0.022 | 0.347 | 0.651  | 1.194  | 0.133 | 0.079 | 0.039 | 0.028  | 2.879  | 0.379 | 0.039 | 0.0008 | 21    |
| 22    | 0.013 | 0.183 | 0.619  | 0.883  | 0.148 | 0.077 | 0.039 | 0.028  | 2.922  | 0.272 | 0.032 | 0.0008 | 22    |
| 23    | 0.010 | 0.171 | 0.550  | 0.703  | 0.162 | 0.075 | 0.039 | 0.028  | 2.464  | 0.158 | 0.035 | 0.0007 | 23    |
| 24    | 0.016 | 0.114 | 1.038  | 0.593  | 0.164 | 0.073 | 0.039 | 0.029  | 2.211  | 0.106 | 0.037 | 0.0007 | 24    |
| 25    | 0.082 | 0.068 | 2.025  | 0.520  | 0.159 | 0.070 | 0.039 | 0.029  | 2.759  | 0.313 | 0.027 | 0.0007 | 25    |
| 26    | 0.150 | 0.085 | 2.824  | 0.763  | 0.156 | 0.069 | 0.039 | 0.031  | 4.59   | 0.283 | 0.021 | 0.0008 | 26    |
| 27    | 0.142 | 0.266 | 2.083  | 8.67   | 0.151 | 0.068 | 0.039 | 0.038  | 2.879  | 0.167 | 0.019 | 0.0010 | 27    |
| 28    | 1.537 | 0.169 | 2.392  | 5.91   | 0.146 | 0.067 | 0.039 | 0.241  | 1.958  | 0.116 | 0.021 | 0.0010 | 28    |
| 29    | 0.514 | 0.097 | 1.817  | 2.034  | 0.143 | 0.066 |       | 2.792  | 1.178  | 0.090 | 0.012 | 0.0008 | 29    |
| 30    | 0.180 | 0.077 | 1.186  | 1.300  | 0.137 | 0.065 |       | 7.2    | 0.890  | 0.070 | 0.010 | 0.0007 | 30    |
| 31    | 0.095 |       | 0.911  |        | 0.133 | 0.065 |       | 6.3    |        | 0.106 |       | 0.0007 | 31    |
| TOTAL | 3.995 | 2.403 | 29.979 | 75.524 | 7.001 | 2.917 | 1.298 | 17.407 | 96.677 | 6.164 | 1.928 | 0.068  | TOTAL |
| MEAN  | 0.129 | 0.080 | 0.967  | 2.517  | 0.226 | 0.094 | 0.046 | 0.562  | 3.223  | 0.199 | 0.064 | 0.002  | MEAN  |
| ST.D. | 0.283 | 0.095 | 0.655  | 2.964  | 0.166 | 0.022 | 0.007 | 1.700  | 1.509  | 0.159 | 0.040 | 0.002  | ST.D. |
| MAX   | 1.537 | 0.353 | 2.824  | 13.300 | 0.854 | 0.132 | 0.062 | 7.200  | 5.580  | 0.736 | 0.146 | 0.008  | MAX   |
| MIN   | 0.002 | 0.010 | 0.191  | 0.520  | 0.119 | 0.065 | 0.039 | 0.028  | 0.890  | 0.049 | 0.010 | 0.001  | MIN   |

NOTE: all values in m<sup>3</sup>/s

## TOTAL DAILY DISCHARGE - STATION SW3

| Day   | Aug   | Sept  | 1988<br>Oct | Nov    | Dec   | 1989<br>Jan | Feb   | Mar   | Apr    | May   | June  | July  | Day   |
|-------|-------|-------|-------------|--------|-------|-------------|-------|-------|--------|-------|-------|-------|-------|
| 1     | 0.043 | 0.164 | 0.360       | 0.616  | 0.501 | 0.234       | 0.172 | 0.142 | 1.001  | 0.472 | 0.232 | 0.074 | 1     |
| 2     | 0.051 | 0.139 | 0.596       | 0.608  | 0.449 | 0.231       | 0.170 | 0.142 | 0.969  | 0.421 | 0.230 | 0.069 | 2     |
| 3     | 0.056 | 0.124 | 0.543       | 0.546  | 0.413 | 0.230       | 0.169 | 0.141 | 0.958  | 0.376 | 0.217 | 0.064 | 3     |
| 4     | 0.053 | 0.158 | 0.533       | 0.544  | 0.374 | 0.229       | 0.166 | 0.140 | 0.937  | 0.339 | 0.191 | 0.061 | 4     |
| 5     | 0.061 | 0.148 | 0.475       | 1.425  | 0.343 | 0.226       | 0.165 | 0.138 | 0.930  | 0.328 | 0.171 | 0.058 | 5     |
| 6     | 0.068 | 0.143 | 0.380       | 1.730  | 0.323 | 0.225       | 0.163 | 0.137 | 0.914  | 0.326 | 0.160 | 0.056 | 6     |
| 7     | 0.063 | 0.123 | 0.324       | 0.891  | 0.297 | 0.226       | 0.161 | 0.135 | 0.893  | 0.297 | 0.152 | 0.054 | 7     |
| 8     | 0.059 | 0.111 | 0.298       | 0.691  | 0.277 | 0.226       | 0.159 | 0.135 | 0.853  | 0.275 | 0.160 | 0.052 | 8     |
| 9     | 0.059 | 0.107 | 0.272       | 0.587  | 0.268 | 0.222       | 0.158 | 0.134 | 0.779  | 0.251 | 0.231 | 0.050 | 9     |
| 10    | 0.053 | 0.096 | 0.411       | 0.604  | 0.261 | 0.219       | 0.156 | 0.134 | 0.676  | 0.235 | 0.211 | 0.047 | 10    |
| 11    | 0.045 | 0.080 | 0.496       | 0.644  | 0.261 | 0.215       | 0.155 | 0.132 | 0.581  | 0.220 | 0.179 | 0.045 | 11    |
| 12    | 0.045 | 0.086 | 0.445       | 0.547  | 0.261 | 0.212       | 0.153 | 0.131 | 0.523  | 0.204 | 0.155 | 0.043 | 12    |
| 13    | 0.073 | 0.121 | 0.406       | 0.663  | 0.261 | 0.209       | 0.152 | 0.131 | 0.598  | 0.197 | 0.150 | 0.040 | 13    |
| 14    | 0.264 | 0.108 | 0.380       | 0.679  | 0.252 | 0.207       | 0.150 | 0.130 | 0.648  | 0.192 | 0.144 | 0.037 | 14    |
| 15    | 0.269 | 0.096 | 0.354       | 0.641  | 0.251 | 0.204       | 0.149 | 0.129 | 0.772  | 0.184 | 0.175 | 0.035 | 15    |
| 16    | 0.195 | 0.087 | 0.356       | 0.756  | 0.240 | 0.202       | 0.148 | 0.128 | 0.840  | 0.175 | 0.217 | 0.035 | 16    |
| 17    | 0.354 | 0.086 | 0.565       | 0.737  | 0.232 | 0.197       | 0.147 | 0.128 | 0.991  | 0.167 | 0.244 | 0.035 | 17    |
| 18    | 0.304 | 0.091 | 0.629       | 0.610  | 0.225 | 0.196       | 0.146 | 0.127 | 0.902  | 0.158 | 0.236 | 0.034 | 18    |
| 19    | 0.193 | 0.112 | 0.563       | 0.528  | 0.233 | 0.192       | 0.145 | 0.126 | 0.833  | 0.156 | 0.193 | 0.034 | 19    |
| 20    | 0.143 | 0.350 | 0.491       | 0.588  | 0.245 | 0.191       | 0.143 | 0.125 | 0.812  | 0.186 | 0.163 | 0.032 | 20    |
| 21    | 0.113 | 0.347 | 0.449       | 0.574  | 0.235 | 0.190       | 0.143 | 0.125 | 0.822  | 0.360 | 0.143 | 0.030 | 21    |
| 22    | 0.091 | 0.268 | 0.439       | 0.508  | 0.246 | 0.188       | 0.143 | 0.125 | 0.827  | 0.315 | 0.131 | 0.029 | 22    |
| 23    | 0.082 | 0.260 | 0.419       | 0.463  | 0.255 | 0.186       | 0.143 | 0.125 | 0.772  | 0.252 | 0.137 | 0.028 | 23    |
| 24    | 0.100 | 0.221 | 0.543       | 0.432  | 0.256 | 0.184       | 0.143 | 0.126 | 0.738  | 0.214 | 0.140 | 0.028 | 24    |
| 25    | 0.193 | 0.179 | 0.712       | 0.410  | 0.253 | 0.181       | 0.143 | 0.127 | 0.808  | 0.333 | 0.123 | 0.027 | 25    |
| 26    | 0.247 | 0.196 | 0.816       | 0.479  | 0.251 | 0.180       | 0.143 | 0.129 | 0.885  | 0.319 | 0.110 | 0.029 | 26    |
| 27    | 0.241 | 0.312 | 0.721       | 1.321  | 0.248 | 0.179       | 0.143 | 0.142 | 0.822  | 0.258 | 0.106 | 0.032 | 27    |
| 28    | 0.637 | 0.259 | 0.762       | 1.038  | 0.244 | 0.178       | 0.143 | 0.299 | 0.703  | 0.222 | 0.111 | 0.031 | 28    |
| 29    | 0.408 | 0.206 | 0.681       | 0.714  | 0.242 | 0.177       |       | 0.812 | 0.571  | 0.200 | 0.089 | 0.029 | 29    |
| 30    | 0.266 | 0.188 | 0.573       | 0.595  | 0.238 | 0.176       |       | 1.176 | 0.510  | 0.181 | 0.080 | 0.028 | 30    |
| 31    | 0.205 |       | 0.515       |        | 0.235 | 0.176       |       | 1.081 |        | 0.214 |       | 0.028 | 31    |
| TOTAL | 5.033 | 4.967 | 15.507      | 21.169 | 8.669 | 6.286       | 4.273 | 6.933 | 23.866 | 8.028 | 4.982 | 1.274 | TOTAL |
| MEAN  | 0.162 | 0.166 | 0.500       | 0.706  | 0.280 | 0.203       | 0.153 | 0.224 | 0.796  | 0.259 | 0.166 | 0.041 | MEAN  |
| ST.D. | 0.134 | 0.078 | 0.138       | 0.296  | 0.067 | 0.020       | 0.009 | 0.268 | 0.138  | 0.080 | 0.045 | 0.013 | ST.D. |
| MAX   | 0.637 | 0.350 | 0.816       | 1.730  | 0.501 | 0.234       | 0.172 | 1.176 | 1.001  | 0.472 | 0.244 | 0.074 | MAX   |
| MIN   | 0.043 | 0.080 | 0.272       | 0.410  | 0.225 | 0.176       | 0.143 | 0.125 | 0.510  | 0.156 | 0.080 | 0.027 | MIN   |

NOTE: all values in m<sup>3</sup>/s



## TOTAL DAILY DISCHARGE - BIG CARP RIVER

| Day   | 1988   |        |        | 1989   |        |        | 1989  |       |        | 1989   |        |       | Day   |
|-------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|--------|-------|-------|
|       | Aug    | Sept   | Oct    | Nov    | Dec    | Jan    | Feb   | Mar   | Apr    | May    | June   | July  |       |
| 1     | 0.038  | 0.316  | 1.1    | 2.58   | 1.86   | 0.555  | 0.34  | 0.252 | 5.58   | 1.69   | 0.547  | 0.089 | 1     |
| 2     | 0.049  | 0.243  | 2.45   | 2.53   | 1.56   | 0.545  | 0.334 | 0.25  | 5.3    | 1.41   | 0.541  | 0.079 | 2     |
| 3     | 0.058  | 0.203  | 2.11   | 2.13   | 1.37   | 0.54   | 0.33  | 0.249 | 5.2    | 1.18   | 0.494  | 0.071 | 3     |
| 4     | 0.053  | 0.298  | 2.05   | 2.12   | 1.17   | 0.536  | 0.323 | 0.245 | 5.02   | 1      | 0.402  | 0.066 | 4     |
| 5     | 0.065  | 0.267  | 1.71   | 9.77   | 1.02   | 0.526  | 0.318 | 0.24  | 4.96   | 0.949  | 0.336  | 0.061 | 5     |
| 6     | 0.078  | 0.255  | 1.2    | 13.3   | 0.927  | 0.52   | 0.312 | 0.238 | 4.83   | 0.941  | 0.305  | 0.057 | 6     |
| 7     | 0.069  | 0.199  | 0.931  | 4.64   | 0.81   | 0.524  | 0.307 | 0.233 | 4.65   | 0.81   | 0.279  | 0.054 | 7     |
| 8     | 0.063  | 0.169  | 0.814  | 3.1    | 0.725  | 0.524  | 0.302 | 0.232 | 4.33   | 0.717  | 0.303  | 0.051 | 8     |
| 9     | 0.062  | 0.16   | 0.706  | 2.39   | 0.69   | 0.51   | 0.298 | 0.23  | 3.75   | 0.622  | 0.545  | 0.048 | 9     |
| 10    | 0.053  | 0.135  | 1.36   | 2.5    | 0.66   | 0.499  | 0.292 | 0.228 | 2.99   | 0.559  | 0.472  | 0.044 | 10    |
| 11    | 0.041  | 0.102  | 1.83   | 2.77   | 0.659  | 0.485  | 0.289 | 0.225 | 2.35   | 0.503  | 0.364  | 0.041 | 11    |
| 12    | 0.041  | 0.114  | 1.54   | 2.14   | 0.659  | 0.476  | 0.283 | 0.222 | 1.99   | 0.447  | 0.29   | 0.038 | 12    |
| 13    | 0.087  | 0.195  | 1.33   | 2.9    | 0.66   | 0.465  | 0.28  | 0.22  | 2.46   | 0.422  | 0.273  | 0.033 | 13    |
| 14    | 0.674  | 0.162  | 1.2    | 3.01   | 0.626  | 0.457  | 0.275 | 0.218 | 2.8    | 0.404  | 0.256  | 0.03  | 14    |
| 15    | 0.691  | 0.135  | 1.07   | 2.75   | 0.62   | 0.445  | 0.272 | 0.216 | 3.69   | 0.379  | 0.349  | 0.027 | 15    |
| 16    | 0.414  | 0.116  | 1.08   | 3.57   | 0.578  | 0.438  | 0.268 | 0.214 | 4.22   | 0.351  | 0.493  | 0.027 | 16    |
| 17    | 1.07   | 0.114  | 2.25   | 3.43   | 0.546  | 0.422  | 0.265 | 0.212 | 5.49   | 0.324  | 0.594  | 0.027 | 17    |
| 18    | 0.839  | 0.125  | 2.67   | 2.54   | 0.521  | 0.42   | 0.262 | 0.211 | 4.73   | 0.298  | 0.562  | 0.026 | 18    |
| 19    | 0.41   | 0.173  | 2.24   | 2.02   | 0.55   | 0.407  | 0.26  | 0.209 | 4.17   | 0.293  | 0.41   | 0.026 | 19    |
| 20    | 0.254  | 1.05   | 1.8    | 2.4    | 0.598  | 0.402  | 0.254 | 0.206 | 4      | 0.387  | 0.312  | 0.024 | 20    |
| 21    | 0.174  | 1.04   | 1.56   | 2.31   | 0.56   | 0.399  | 0.253 | 0.205 | 4.08   | 1.1    | 0.253  | 0.021 | 21    |
| 22    | 0.125  | 0.687  | 1.51   | 1.9    | 0.6    | 0.392  | 0.253 | 0.205 | 4.12   | 0.888  | 0.221  | 0.02  | 22    |
| 23    | 0.105  | 0.658  | 1.4    | 1.64   | 0.636  | 0.386  | 0.255 | 0.205 | 3.69   | 0.624  | 0.236  | 0.019 | 23    |
| 24    | 0.144  | 0.507  | 2.11   | 1.47   | 0.64   | 0.378  | 0.255 | 0.208 | 3.44   | 0.483  | 0.245  | 0.019 | 24    |
| 25    | 0.408  | 0.364  | 3.25   | 1.35   | 0.627  | 0.37   | 0.255 | 0.21  | 3.97   | 0.972  | 0.201  | 0.018 | 25    |
| 26    | 0.605  | 0.418  | 4.03   | 1.73   | 0.62   | 0.365  | 0.255 | 0.217 | 4.59   | 0.91   | 0.168  | 0.02  | 26    |
| 27    | 0.582  | 0.876  | 3.31   | 8.67   | 0.607  | 0.362  | 0.255 | 0.25  | 4.08   | 0.647  | 0.159  | 0.024 | 27    |
| 28    | 2.72   | 0.652  | 3.62   | 5.91   | 0.595  | 0.36   | 0.255 | 0.82  | 3.18   | 0.511  | 0.17   | 0.023 | 28    |
| 29    | 1.34   | 0.455  | 3.03   | 3.26   | 0.585  | 0.356  |       | 4     | 2.29   | 0.434  | 0.119  | 0.02  | 29    |
| 30    | 0.68   | 0.391  | 2.3    | 2.44   | 0.57   | 0.353  |       | 7.2   | 1.91   | 0.368  | 0.102  | 0.019 | 30    |
| 31    | 0.449  |        | 1.94   |        | 0.56   | 0.352  |       | 6.3   |        | 0.482  |        | 0.019 | 31    |
| TOTAL | 12.441 | 10.579 | 59.501 | 103.27 | 23.409 | 13.769 | 7.9   | 24.37 | 117.86 | 21.105 | 10.001 | 1.141 | TOTAL |
| MEAN  | 0.401  | 0.353  | 1.919  | 3.442  | 0.755  | 0.444  | 0.282 | 0.786 | 3.929  | 0.681  | 0.333  | 0.037 | MEAN  |
| ST.D. | 0.540  | 0.270  | 0.839  | 2.617  | 0.315  | 0.068  | 0.028 | 1.708 | 1.033  | 0.343  | 0.140  | 0.020 | ST.D. |
| MAX   | 2.720  | 1.050  | 4.030  | 13.300 | 1.860  | 0.555  | 0.340 | 7.200 | 5.580  | 1.690  | 0.594  | 0.089 | MAX   |
| MIN   | 0.038  | 0.102  | 0.706  | 1.350  | 0.521  | 0.352  | 0.253 | 0.205 | 1.910  | 0.293  | 0.102  | 0.018 | MIN   |

NOTE: all values in m<sup>3</sup>/s

**APPENDIX 11**

**SURFACE WATER QUALITY DATA**

| SURFACE WATER SITE           | SW-1       | SW-1       | SW-1      | SW-1       | SW-1      | SW-1      | SW-1      |
|------------------------------|------------|------------|-----------|------------|-----------|-----------|-----------|
| Sample Date (mm/dd/yy)       | 08/13/88   | 09/24/88   | 10/22/88  | 12/02/88   | 04/11/89  | 05/12/89  | 06/16/89  |
| BAS Reference Number         | 8808067-08 | 8809202-01 | 8810139-1 | 8812017-01 | 8904077-1 | 8905083-1 | 8906104-1 |
| Sampling Level               | 3          | 1          | 2         | 1          | 2         | 1         | 1         |
| pH                           | 7.2        | 7.5        | 7.8       | 7.5        | 6.5       | 6.5       | 7.7       |
| Specific Conductance (uS/cm) | 321        | 101        | 95        | 86.6       | 80        | 120       | 140       |
| Temperature (C)              | 23.5       | 16         | 7         | 1          | -1        | 11        | 15.5      |
| Dissolved Oxygen             | 8          | NA         | NA        | NA         | 16.4      | 12.2      | 8.8       |
| Dissolved Inorganic Carbon   | 18         | NA         | NA        | NA         | NA        | NA        | NA        |
| Alkalinity (as CaCO3)        | 64         | NA         | 25        | 22         | 24        | 26        | 35        |
| Sulphide                     | <0.05      | NA         | NA        | NA         | NA        | NA        | NA        |
| Total Cyanide                | 0.004      | NA         | NA        | NA         | 0.003     | NA        | NA        |
| Bromide                      | <0.1       | <0.05      | <0.05     | <0.05      | <0.005    | NA        | <0.05     |
| Chloride                     | 18.2       | 7.0        | 8.2       | 6.0        | 9.8       | NA        | 13.2      |
| Fluoride                     | 0.12       | 0.06       | 0.06      | 0.07       | 0.06      | NA        | 0.05      |
| Sulphate                     | 51         | 22         | 25        | 36         | 16        | NA        | 19        |
| Ammonia-N                    | 0.5        | NA         | NA        | NA         | NA        | NA        | NA        |
| Nitrate-N                    | 0.04       | 0.12       | 0.11      | 0.24       | 0.48      | NA        | 0.14      |
| Total Kjeldahl Nitrogen      | 0.71       | NA         | 0.42/0.39 | 0.38       | 0.33/0.31 | 0.55      | 0.55      |
| Total Phosphorus             | 0.006      | NA         | 0.006     | 0.015      | 0.009     | 0.01      | 0.006     |
| Dissolved Organic Carbon     | 5.5        | 9.5        | 6.5       | 5.5/6.0    | 5.8/5.8   | 5.7/6.1   | 7.5       |
| Phenols                      | 0.006      | <0.001     | <0.001    | <0.001     | <0.001    | <0.001    | <0.001    |
| PCB's                        | <0.1       | NA         | NA        | NA         | NA        | NA        | NA        |
| Oil and Grease               | 1          | <1         | NA        | NA         | NA        | NA        | NA        |
| Zinc                         | <0.01      | <0.01      | NA        | NA         | 0.02      | NA        | NA        |
| Cadmium                      | 0.0008     | <0.0002    | NA        | NA         | <0.005    | NA        | NA        |
| Manganese                    | 0.23       | 0.06       | NA        | NA         | 0.05      | NA        | NA        |
| Cobalt                       | <0.01      | <0.01      | NA        | NA         | <0.01     | NA        | NA        |
| Copper                       | <0.005     | <0.005     | NA        | NA         | <0.005    | NA        | NA        |
| Iron                         | 3.1        | 1.04       | NA        | NA         | 0.56      | NA        | NA        |
| Lead                         | <0.05      | <0.05      | NA        | NA         | <0.05     | NA        | NA        |
| Chromium                     | <0.01      | <0.01      | NA        | NA         | <0.01     | NA        | NA        |
| Nickel                       | <0.01      | <0.01      | NA        | NA         | <0.01     | NA        | NA        |
| Beryllium                    | <0.01      | NA         | NA        | <0.01      | <0.01     | NA        | NA        |
| Molybdenum                   | <0.02      | NA         | NA        | <0.02      | <0.02     | NA        | NA        |
| Calcium                      | 32         | NA         | 14.8      | 16.7       | 12        | 17        | NA        |
| Vanadium                     | <0.01      | NA         | NA        | <0.01      | <0.01     | NA        | NA        |
| Aluminum                     | 0.2        | NA         | NA        | 0.16       | 0.26      | NA        | NA        |
| Magnesium                    | 6.6        | NA         | 3.3       | 3.1        | 2.8       | 3.6       | NA        |
| Barium                       | 0.02       | NA         | NA        | 0.01       | 0.01/0.02 | NA        | NA        |
| Potassium                    | 3.9        | NA         | 2.2       | 2.7        | 1.5       | 2.4       | NA        |
| Strontium                    | 0.13       | NA         | NA        | 0.06       | 0.05      | NA        | NA        |
| Sodium                       | 11.0       | NA         | 5.5       | 4.0        | 5.5       | 5.5       | NA        |
| Mercury (ug/L)               | <0.05      | NA         | NA        | NA         | NA        | NA        | NA        |
| Arsenic (ug/L)               | <0.1       | NA         | NA        | NA         | NA        | NA        | NA        |
| Selenium (ug/L)              | <0.1       | NA         | NA        | NA         | NA        | NA        | NA        |

NOTE: All Units are in (mg/L) unless otherwise specified  
NA Not Analyzed

| SURFACE WATER SITE       | SW-1       | SW-1       | SW-1      | SW-1       | SW-1      | SW-1      | SW-1      |
|--------------------------|------------|------------|-----------|------------|-----------|-----------|-----------|
| Sample Date (mm/dd/yy)   | 08/13/88   | 09/24/88   | 10/22/88  | 12/02/88   | 04/11/89  | 05/12/89  | 06/16/89  |
| BAS Reference Number     | 8808067-08 | 8809202-01 | 8810139-1 | 8812017-01 | 8904077-1 | 8905083-1 | 8906104-1 |
| Sampling Level           | 3          | 1          | 2         | 1          | 2         |           |           |
| PAHs (ug/L)              |            |            |           |            |           |           |           |
| Naphthalene              | 0.02       | NA         | 0.1       | NA         | <0.1      | NA        | NA        |
| Acenaphthalene           | <0.01      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Acenaphthene             | <0.01      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Fluorene                 | <0.01      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Phenanthrene             | 0.05       | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Anthracene               | <0.01      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Fluoranthene             | <0.01      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Pyrene                   | <0.01      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Benzo(a)anthracene       | <0.02      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Chrysene                 | <0.02      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Benzo(b)fluoranthene     | <0.05      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Benzo(k)fluoranthene     | <0.05      | NA         | *         | NA         | <0.1      | NA        | NA        |
| Benzo(a)pyrene           | <0.05      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Perylene                 | <0.05      | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Indelol(1,2,3-c,d)pyrene | <0.1       | NA         | <0.1      | NA         | <0.1      | NA        | NA        |
| Dibenzo(a,h)anthracene   | <0.2       | NA         | <0.1      | NA         | <0.5      | NA        | NA        |
| Benzo(g,h,i)perylene     | <0.1       | NA         | <0.1      | NA         | <0.5      | NA        | NA        |
| Total PAHs**             | 0.07       | NA         | 0.01      | NA         | ND        | NA        | NA        |
| Benzene                  | NA         | NA         | <2        | NA         | NA        | NA        | NA        |
| Toluene                  | NA         | NA         | <1        | NA         | NA        | NA        | NA        |
| Xylenes                  | NA         | NA         | <1        | NA         | NA        | NA        | NA        |
| Total BTX**              | NA         | NA         | NA        | NA         | NA        | NA        | NA        |

\* The result for Benzo (b) fluorcenthene includes the combined concentration of both Benzo (b) plus Benzo (k) fluorcenthene.

\*\* Positive values only

| SURFACE WATER SITE           | SW-2       | SW-2       | SW-2       | SW-2       | SW-2       | SW-2<br>Trip Blank | SW-2     | SW-2      |
|------------------------------|------------|------------|------------|------------|------------|--------------------|----------|-----------|
| Sample Date (mm/dd/yy)       | 08/13/88   | 09/24/88   | 10/22/88   | 12/02/88   | 04/11/89   | 04/11/89           | 05/12/89 | 06/16/89  |
| BAS Reference Number         | 8808067-06 | 8809202-02 | 8810139-02 | 8812017-02 | 8904077-02 | 8904077-03         | 8905083  | 8906104   |
| Sampling Level               | 2          | 1          | 2          | 1          | 2          | 2                  | 1        | 1         |
| pH                           | 7.7        | 8          | 7.9        | 7.9        | 7.2        |                    | 6.75     | 7.9       |
| Specific Conductance (uS/cm) | 171        | 67         | 71         | 44.8       | 55         |                    | 65       | NA        |
| Temperature (C)              | 21.5       | 15         | 7          | 1.5        | 1          |                    | 9        | 15.5      |
| Dissolved Oxygen             | 8.4        | NA         | NA         | NA         | 14.8       |                    | 11       | NA        |
| Dissolved Inorganic Carbon   | 14         | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |
| Alkalinity (as CaCO3)        | 52         | NA         | 20         | 16         | 19         | 2                  | 17       | 28        |
| Sulphide                     | <0.05      | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |
| Total Cyanide                | NA         | NA         | NA         | NA         | <0.002     | <0.002             | NA       | NA        |
| Bromide                      | <0.1       | <0.05      | <0.05      | <0.05      | <0.05      | <0.05              | NA       | <0.05     |
| Chloride                     | 13.8       | 5/5        | 5.5        | 4.5        | 7.3        | 0.02               | NA       | 10.7/10.6 |
| Fluoride                     | 0.08       | 0.05       | 0.003      | 0.04       | 0.02       | <0.01              | NA       | 0.06/0.06 |
| Sulphate                     | 8.8        | 9.0/8.9    | 11.2       | 10.6       | 9.0        | <0.05              | NA       | 5.7/5.6   |
| Ammonia-N                    | NA         | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |
| Nitrate-N                    | 0.12       | 0.07/0.07  | 0.09       | 0.21       | 0.46       | <0.01              | NA       | 0.14/0.14 |
| Total Kjeldahl Nitrogen      | 0.26       | NA         | 0.3        | 0.28       | 0.29       | 0.04               | 0.26     | 0.37      |
| Total Phosphorus             | NA         | NA         | 0.004      | 0.01       | 0.016      | <0.001             | 0.009    | 0.009     |
| Dissolved Organic Carbon     | 5          | 9          | 7.0/7.0    | 5.5        | 5.8        | <0.5               | 5.2      | 7.5       |
| Phenols                      | <0.001     | <0.001     | <0.001     | <0.001     | 0.003      | 0.005              | <0.001   | <0.001    |
| PCB's                        | NA         | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |
| Oil and Grease               | NA         | 2          | NA         | NA         | NA         | NA                 | NA       | NA        |
| Zinc                         | 0.02       | 0.01       | NA         | NA         | 0.01       | <0.01              | NA       | NA        |
| Cadmium                      | 0.0006     | <0.0002    | NA         | NA         | <0.005     | <0.005             | NA       | NA        |
| Manganese                    | 0.08       | 0.03       | NA         | NA         | 0.04       | <0.01              | NA       | NA        |
| Cobalt                       | <0.01      | <0.01      | NA         | NA         | <0.01      | <0.01              | NA       | NA        |
| Copper                       | <0.005     | <0.005     | NA         | NA         | <0.005     | <0.005             | NA       | NA        |
| Iron                         | 0.56       | 0.6        | NA         | NA         | 0.40       | <0.02              | NA       | NA        |
| Lead                         | <0.05      | <0.05      | NA         | NA         | <0.05      | <0.05              | NA       | NA        |
| Chromium                     | <0.01      | <0.01      | NA         | NA         | <0.01      | <0.01              | NA       | NA        |
| Nickel                       | <0.01      | <0.01      | NA         | NA         | <0.01      | <0.01              | NA       | NA        |
| Beryllium                    | <0.01      | NA         | NA         | <0.01      | <0.01      | <0.01              | NA       | NA        |
| Molybdenum                   | <0.02      | NA         | NA         | <0.02      | <0.02      | <0.02              | NA       | NA        |
| Calcium                      | 17.7       | NA         | 8.9        | 8.0/8.2    | 8.5        | <0.05              | 8.2      | NA        |
| Vanadium                     | <0.01      | NA         | NA         | <0.01      | <0.01      | <0.01              | NA       | NA        |
| Aluminum                     | 0.4        | NA         | NA         | 0.18/0.20  | 0.3        | <0.02              | NA       | NA        |
| Magnesium                    | 4          | NA         | 2.2        | 1.95/2.00  | 2.1        | <0.05              | 1.9      | NA        |
| Barium                       | 0.02       | NA         | NA         | 0.02/0.02  | 0.01       | <0.01              | NA       | NA        |
| Potassium                    | 1.55       | NA         | 0.75       | 0.60/0.60  | 0.75       | <0.05              | 0.6      | NA        |
| Strontium                    | 0.07       | NA         | NA         | 0.03/0.04  | 0.04       | <0.01              | NA       | NA        |
| Sodium                       | 9.0        | NA         | 4.0        | 3.0/3.0    | 4.0        | <0.5               | 4        | NA        |
| Mercury (ug/L)               | NA         | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |
| Arsenic (ug/L)               | NA         | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |
| Selenium (ug/L)              | NA         | NA         | NA         | NA         | NA         | NA                 | NA       | NA        |

NOTE: All Units are in (mg/L) unless otherwise specified  
NA Not Analyzed

|                    |      |      |      |      |      |            |
|--------------------|------|------|------|------|------|------------|
| SURFACE WATER SITE | SW-2 | SW-2 | SW-2 | SW-2 | SW-2 | SW-2       |
|                    |      |      |      |      |      | Trip Blank |

|                        |            |            |            |            |            |            |
|------------------------|------------|------------|------------|------------|------------|------------|
| Sample Date (mm/dd/yy) | 08/13/88   | 09/24/88   | 10/22/88   | 12/02/88   | 04/11/89   | 04/11/89   |
| BAS Reference Number   | 8808067-06 | 8809202-02 | 8810139-02 | 8812017-02 | 8904077-02 | 8904077-03 |
| Sampling Level         | 2          | 1          | 2          | 1          | 2          | 2          |

PAHs (ug/L)

|                          |       |    |      |    |      |      |
|--------------------------|-------|----|------|----|------|------|
| Naphthalene              | 0.03  | NA | 0.01 | NA | <0.1 | <0.1 |
| Acenaphthalene           | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Acenaphthene             | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Fluorene                 | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Phenanthrene             | 0.03  | NA | <0.1 | NA | <0.1 | <0.1 |
| Anthracene               | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Fluoranthene             | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Pyrene                   | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Benzo(a)anthracene       | <0.01 | NA | <0.1 | NA | <0.1 | <0.1 |
| Chrysene                 | <0.02 | NA | <0.1 | NA | <0.1 | <0.1 |
| Benzo(b)fluoranthene     | <0.05 | NA | <0.1 | NA | <0.1 | <0.1 |
| Benzo(k)fluoranthene     | <0.05 | NA | *    | NA | <0.1 | <0.1 |
| Benzo(a)pyrene           | <0.05 | NA | <0.1 | NA | <0.1 | <0.1 |
| Perylene                 | <0.05 | NA | <0.1 | NA | <0.1 | <0.1 |
| Indelol(1,2,3-c,d)pyrene | <0.1  | NA | <0.1 | 1  | <0.1 | <0.1 |
| Dibenzo(a,h)anthracene   | <0.2  | NA | <0.1 | N  | <0.5 | <0.5 |
| Benzo(g,h,i)perylene     | <0.1  | NA | <0.1 | N  | <0.5 | <0.5 |
| Total PAHs**             | 0.06  | NA | 0.01 | NA | ND   | ND   |
| Benzene                  | NA    | NA | <2   | NA | NA   | NA   |
| Toluene                  | NA    | NA | <1   | NA | NA   | NA   |
| Xylenes                  | NA    | NA | <1   | NA | NA   | NA   |
| Total BTX**              | NA    | NA | ND   | NA | NA   | NA   |

\* The result for Benzo (b) fluorcenthene includes the combined concentration of both Benzo (b) plus Benzo (k) fluorcenthene

\*\* Positive values only

| SURFACE WATER SITE           | SW-3<br>Rep-1 | SW-3<br>Rep-2 | SW-3       | SW-3       | SW-3       | SW-3       | SW-3     | SW-3     |
|------------------------------|---------------|---------------|------------|------------|------------|------------|----------|----------|
| Sample Date (mm/dd/yy)       | 08/13/88      | 08/13/88      | 9/24/88    | 10/22/88   | 12/02/88   | 04/11/89   | 05/12/89 | 06/16/89 |
| BAS Reference Number         | 8808067-01    | 8808067-02    | 8809202-03 | 8810139-03 | 8812017-03 | 8904077-04 | 8905083  | 8906104  |
| Sampling Level               | 1             | 1             | 1          | 2          | 1          | 2          | 1        | 1        |
| pH                           | 6.8           | 6.8           | 8.0        | 8.4        | 8.3        | 8.1        | 9.97     | NA       |
| Specific Conductance (uS/cm) | 337           | 337           | 140        | 91         | 69         | 82         | 80       | NA       |
| Temperature (C)              | 18            | 18            | 12.5       | 7          | 3          | 1.5        | 9        | NA       |
| Dissolved Oxygen             | 8.1           | 8.1           | NA         | NA         | NA         | 12.6       | 13.2     | NA       |
| Dissolved Inorganic Carbon   | NA            | NA            | NA         | NA         | NA         | 5.0        | NA       | NA       |
| Alkalinity (as CaCO3)        | NA            | NA            | NA         | 32/32      | 33         | 32         | 24       | NA       |
| Sulphide                     | NA            | NA            | NA         | NA         | NA         | NA         | NA       | NA       |
| Total Cyanide                | NA            | NA            | NA         | NA         | NA         | 0.002      | NA       | NA       |
| Bromide                      | <0.1          | <0.1          | <0.05      | <0.05      | <0.05      | <0.05      | NA       | NA       |
| Chloride                     | 19.8          | 21            | 14.7       | 12.1/11.9  | 10.1       | 13.8/13.8  | NA       | NA       |
| Fluoride                     | 0.08          | 0.08          | 0.08       | 0.04/0.04  | 0.07       | 0.05/0.06  | NA       | NA       |
| Sulphate                     | 11.3          | 11.6          | 13.8       | 13.7/13.4  | 13.0       | 10.0/10.0  | NA       | NA       |
| Ammonia-N                    | NA            | NA            | NA         | NA         | NA         | NA         | NA       | NA       |
| Nitrate-N                    | 0.54          | 0.56          | 0.3        | 0.28/0.27  | 0.41       | 0.45/0.46  | NA       | NA       |
| Total Kjeldahl Nitrogen      | NA            | NA            | NA         | 0.28       | 0.27       | 0.31       | 0.22     | NA       |
| Total Phosphorus             | NA            | NA            | NA         | 0.004      | 0.013      | 0.027      | 0.006    | NA       |
| Dissolved Organic Carbon     | 4.0           | 4.0           | 7.0/7.0    | 5.5        | 4.5        | 5.0        | 4.1      | NA       |
| Phenols                      | 0.004         | 0.011         | 0.001      | 0.001      | <0.001     | 0.003      | <0.001   | NA       |
| PCB's                        | NA            | NA            | NA         | NA         | NA         | NA         | NA       | NA       |
| Oil and Grease               | <1.0          | 3.0           | <1         | NA         | NA         | NA         | NA       | NA       |
| Zinc                         | 0.04          | 0.04          | 0.04       | NA         | NA         | 0.02/0.03  | NA       | NA       |
| Cadmium                      | 0.0002        | 0.0008        | <0.0002    | NA         | NA         | <0.05      | NA       | NA       |
| Manganese                    | 0.09          | 0.09          | 0.06       | NA         | NA         | 0.08/0.08  | NA       | NA       |
| Cobalt                       | <0.01         | <0.01         | <0.01      | NA         | NA         | <0.01      | NA       | NA       |
| Copper                       | <0.005        | <0.005        | <0.005     | NA         | NA         | <0.005     | NA       | NA       |
| Iron                         | 0.98          | 0.98          | 0.48       | NA         | NA         | 0.70/0.68  | NA       | NA       |
| Lead                         | <0.05         | <0.05         | <0.05      | NA         | NA         | <0.05      | NA       | NA       |
| Chromium                     | <0.01         | <0.01         | <0.01      | NA         | NA         | <0.01      | NA       | NA       |
| Nickel                       | <0.01         | <0.01         | <0.01      | NA         | NA         | <0.01      | NA       | NA       |
| Beryllium                    | NA            | NA            | NA         | NA         | <0.01      | <0.01      | NA       | NA       |
| Molybdenum                   | NA            | NA            | NA         | NA         | <0.02      | <0.02      | NA       | NA       |
| Calcium                      | NA            | NA            | NA         | 14.5       | 13.4       | 13.1       | 11       | NA       |
| Vanadium                     | NA            | NA            | NA         | NA         | <0.01      | <0.01      | NA       | NA       |
| Aluminum                     | NA            | NA            | NA         | NA         | 0.42       | 0.52       | NA       | NA       |
| Magnesium                    | NA            | NA            | NA         | 3.2        | 3.5        | 3.4        | 2.7      | NA       |
| Barium                       | NA            | NA            | NA         | NA         | 0.02       | 0.02       | NA       | NA       |
| Potassium                    | NA            | NA            | NA         | 2.7        | 1.05       | 1.1        | 0.95     | NA       |
| Strontium                    | NA            | NA            | NA         | NA         | 0.06       | 0.05       | NA       | NA       |
| Sodium                       | NA            | NA            | NA         | 5.0        | 5.5        | 6.5        | 5        | NA       |
| Mercury (ug/L)               | NA            | NA            | NA         | NA         | NA         | NA         | NA       | NA       |
| Arsenic (ug/L)               | NA            | NA            | NA         | NA         | NA         | NA         | NA       | NA       |
| Selenium (ug/L)              | NA            | NA            | NA         | NA         | NA         | NA         | NA       | NA       |

NOTE: All Units are in (mg/L) unless otherwise specified  
NA Not Analyzed

| SURFACE WATER SITE       | SW-3<br>Rep-1 | SW-3<br>Rep-2 | SW-3    | SW-3       | SW-3       | SW-3       | SW-3     | SW-3     |
|--------------------------|---------------|---------------|---------|------------|------------|------------|----------|----------|
| Sample Date (mm/dd/yy)   | 08/13/88      | 08/13/88      | 9/24/88 | 10/22/88   | 12/02/88   | 04/11/89   | 05/12/89 | 06/16/89 |
| BAS Reference Number     | 8808067-01    | 8808067-02    |         | 8810139-03 | 8812017-03 | 8904077-04 | 8905083  | 8906104  |
| Sampling Level           | 1             | 1             | 1       | 2          | 1          | 2          | 1        | 1        |
| PAHs (ug/L)              |               |               |         |            |            |            |          |          |
| Naphthalene              | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Acenaphthalene           | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Acenaphene               | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Fluorene                 | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Phenanthrene             | NA            | NA            | NA      | 0.2        | NA         | <0.1       | NA       | NA       |
| Anthracene               | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Fluoranthene             | NA            | NA            | NA      | 0.2        | NA         | <0.1       | NA       | NA       |
| Pyrene                   | NA            | NA            | NA      | 0.1        | NA         | <0.1       | NA       | NA       |
| Benzo(a)anthracene       | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Chrysene                 | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Benzo(b)fluoranthene     | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Benzo(k)fluoranthene     | NA            | NA            | NA      | *          | NA         | <0.1       | NA       | NA       |
| Benzo(a)pyrene           | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Perylene                 | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Indelol(1,2,3-c,d)pyrene | NA            | NA            | NA      | <0.1       | NA         | <0.1       | NA       | NA       |
| Dibenzo(a,h)anthracene   | NA            | NA            | NA      | <0.1       | NA         | <0.5       | NA       | NA       |
| Benzo(g,h,i)perylene     | NA            | NA            | NA      | <          | NA         | <0.5       | NA       | NA       |
| Total PAH's**            | NA            | NA            | NA      | 0.5        | NA         | ND         | NA       | NA       |
| Benzene                  | NA            | NA            | NA      | <2         | NA         | NA         | NA       | NA       |
| Toluene                  | NA            | NA            | NA      | <1         | NA         | NA         | NA       | NA       |
| Xylenes                  | NA            | NA            | NA      | <1         | NA         | NA         | NA       | NA       |
| Total BTX**              | NA            | NA            | NA      | ND         | NA         | NA         | NA       | NA       |

\*\* Positive values only



| SURFACE WATER SITE           | SW-4      | SW-4      | SW-4       | SW-4       | SW-4       | SW-4       | SW-4     |
|------------------------------|-----------|-----------|------------|------------|------------|------------|----------|
| Sample Date (mm/dd/yy)       | 08/13/88  | 09/24/88  | 10/22/88   | 12/02/88   | 04/11/89   | 05/12/89   | 06/16/89 |
| BAS Reference Number         | 8808067-3 | 8809202-4 | 8810139-04 | 8812017-04 | 8804077-05 | 8905083-04 | 8906104  |
| Sampling Level               | 1         | 1         | 2          | 1          | 1          | 1          | 1        |
| pH                           | 7.7       | 7.8       | 7.5        | 8.6        | 9.4        | 6.56       | 8.2      |
| Specific Conductance (uS/cm) | 4220      | 3200      | 2620       | 1760       | 2400       | 2000       | 3490     |
| Temperature (C)              | 23        | 18.5      | 8.5        | 1.5        | 4.5        | 12.5       | 16       |
| Dissolved Oxygen             | 6.4       | NA        | NA         | NA         | 7.9        | 8.8        | 8.3      |
| Dissolved Inorganic Carbon   | NA        | NA        | NA         | NA         | NA         | NA         | NA       |
| Alkalinity (as CaCO3)        | NA        | NA        | 46         | 60         | 37/36      | 40         | 38       |
| Sulphide                     | NA        | NA        | NA         | NA         | NA         | NA         | NA       |
| Total Cyanide                | NA        | NA        | NA         | NA         | 0.002      | NA         | NA       |
| Bromide                      | <1.0      | <1.0      | <1.0       | <1.0       | <0.5/0.5   | NA         | 0.6      |
| Chloride                     | 1400      | 1170      | 1460       | 990/990    | 1260/1270  | NA         | 270      |
| Fluoride                     | 1.0       | 1.0       | 1.25       | 1.0        | 090/0.70   | NA         | <1       |
| Sulphate                     | 210/210   | 270       | 260        | 220/230    | 165/170    | NA         | 166      |
| Ammonia-N                    | NA        | NA        | NA         | NA         | NA         | NA         | NA       |
| Nitrate-N                    | <0.2      | 0.25      | <0.2       | 0.2        | <0.1/0.1   | NA         | <0.2     |
| Total Kjeldahl Nitrogen      | NA        | NA        | 1.85       | 1.93       | 1.93       | 1.8        | 3.5      |
| Total Phosphorus             | NA        | NA        | 0.002      | 0.013      | 0.088      | 0.005      | 0.006    |
| Dissolved Organic Carbon     | 7.5/7.5   | 6         | 6          | 6          | 6.4        | 5.8        | 5.9      |
| Phenols                      | 0.034     | 0.27      | 0.72       | 0.32/0.32  | 0.35       | 0.059      | 0.036    |
| PCB's                        | NA        | NA        | NA         | NA         | NA         | NA         | NA       |
| Oil and Grease               | 4.0       | 5.0       | NA         | NA         | NA         | NA         | NA       |
| Zinc                         | 0.02      | 0.02      | NA         | NA         | 0.01       | NA         | NA       |
| Cadmium                      | 0.0008    | <0.0002   | NA         | NA         | <0.005     | NA         | NA       |
| Manganese                    | 1.24      | 1.28      | NA         | NA         | 0.17       | NA         | NA       |
| Cobalt                       | 0.03      | 0.03      | NA         | NA         | <0.01      | NA         | NA       |
| Copper                       | 0.005     | 0.01      | NA         | NA         | <0.005     | NA         | NA       |
| Iron                         | 0.5       | 2.4       | NA         | NA         | 0.3        | NA         | NA       |
| Lead                         | <0.05     | <0.05     | NA         | NA         | <0.05      | NA         | NA       |
| Chromium                     | 0.04      | 0.04      | NA         | NA         | 0.03       | NA         | NA       |
| Nickel                       | 0.02      | 0.02      | NA         | NA         | 0.01       | NA         | NA       |
| Beryllium                    | NA        | NA        | NA         | <0.01      | <0.01      | NA         | NA       |
| Molybdenum                   | NA        | NA        | NA         | 0.02       | 0.04       | NA         | NA       |
| Calcium                      | NA        | NA        | 600        | 480        | 560        | 480        | NA       |
| Vanadium                     | NA        | NA        | NA         | 0.03       | 0.04       | NA         | NA       |
| Aluminum                     | NA        | NA        | NA         | 0.38       | 0.64       | NA         | NA       |
| Magnesium                    | NA        | NA        | 17         | 16.7       | 12.5       | 8.8        | NA       |
| Barium                       | NA        | NA        | NA         | 0.16       | 0.15       | NA         | NA       |
| Potassium                    | NA        | NA        | 44         | 34         | 35         | 33         | NA       |
| Strontium                    | NA        | NA        | NA         | 1.91       | 2.1        | NA         | NA       |
| Sodium                       | NA        | NA        | 92         | 58         | 105        | 78         | NA       |
| Mercury (ug/L)               | NA        | NA        | NA         | NA         | NA         | NA         | NA       |
| Arsenic (ug/L)               | NA        | NA        | NA         | NA         | NA         | NA         | NA       |
| Selenium (ug/L)              | NA        | NA        | NA         | NA         | NA         | NA         | NA       |

NOTE: All Units are in (mg/L) unless otherwise specified  
NA Not Analyzed

| SURFACE WATER SITE       | SW-4      | SW-4      | SW-4       | SW-4       | SW-4       | SW-4     | SW-4     |
|--------------------------|-----------|-----------|------------|------------|------------|----------|----------|
| Sample Date (mm/dd/yy)   | 08/13/88  | 09/24/88  | 10/22/88   | 12/02/88   | 04/11/89   | 05/12/89 | 06/16/89 |
| BAS Reference Number     | 8808067-3 | 8809202-4 | 8810139-04 | 8808067-04 | 8808067-04 | 8905083  | 8906104  |
| Sampling Level           | 1         | 1         | 2          | 1          | 2          | 1        | 1        |
| PAHs (ug/L)              |           |           |            |            |            |          |          |
| Naphthalene              | NA        | NA        | >500       | NA         | 78         | NA       | NA       |
| Acenaphthalene           | NA        | NA        | 17         | NA         | 5.5        | NA       | NA       |
| Acenaphene               | NA        | NA        | 14.4       | NA         | 54         | NA       | NA       |
| Fluorene                 | NA        | NA        | 75         | NA         | 27         | NA       | NA       |
| Phenanthrene             | NA        | NA        | 87         | NA         | 34         | NA       | NA       |
| Anthracene               | NA        | NA        | 5.1        | NA         | 3.2        | NA       | NA       |
| Fluoranthene             | NA        | NA        | 7.1        | NA         | 4.9        | NA       | NA       |
| Pyrene                   | NA        | NA        | 4.1        | NA         | 2.4        | NA       | NA       |
| Benzo(a)anthracene       | NA        | NA        | 0.2        | NA         | 0.1        | NA       | NA       |
| Chrysene                 | NA        | NA        | 0.1        | NA         | 0.1        | NA       | NA       |
| Benzo(b)fluoranthene     | NA        | NA        | <0.1       | NA         | <0.1       | NA       | NA       |
| Benzo(k)fluoranthene     | NA        | NA        | *          | NA         | <0.1       | NA       | NA       |
| Benzo(a)pyrene           | NA        | NA        | <0.1       | NA         | <0.1       | NA       | NA       |
| Perylene                 | NA        | NA        | <0.1       | NA         | <0.1       | NA       | NA       |
| Indelol(1,2,3-c,d)pyrene | NA        | NA        | <0.1       | NA         | <0.1       | NA       | NA       |
| Dibenzo(a,h)anthracene   | NA        | NA        | <0.1       | NA         | <0.5       | NA       | NA       |
| Benzo(g,h,i)perylene     | NA        | NA        | <0.1       | NA         | <0.5       | NA       | NA       |
| Total PAHs**             | NA        | NA        | >710       | NA         | 209.2      | NA       | NA       |
| Benzene                  | NA        | NA        | 22         | NA         | NA         | NA       | NA       |
| Toluene                  | NA        | NA        | 13         | NA         | NA         | NA       | NA       |
| Xylenes                  | NA        | NA        | 30         | NA         | NA         | NA       | NA       |
| Total BTX                | NA        | NA        | 65         | NA         | NA         | NA       | NA       |

\* The result for Benzo (b) fluorcenthene includes the combined concentration of both Benzo (b) plus Benzo (k) fluorcenthene.

\*\* Positive values only

| SURFACE WATER SITE           | SW-5       | SW-5       | SW-5       | SW-5     | SW-5<br>Rep 1 | SW-5<br>Rep 2 | SW-5     | SW-5     |
|------------------------------|------------|------------|------------|----------|---------------|---------------|----------|----------|
| Sample Date (mm/dd/yy)       | 08/13/88   | 09/24/88   | 10/22/88   | 12/02/88 | 04/11/89      | 04/11/89      | 05/12/89 | 06/16/89 |
| BAS Reference Number         | 8808067-07 | 8809202-05 | 8810139-05 | 8812017  | 8904077-06    | 8904077-07    | 8905083  | 8906104  |
| Sampling Level               | 2          | 1          | 2          | 1        | 2             | 2             | 1        | 1        |
| pH                           | 11.3       | 11.3       | 11.4       | 11.0     | 11.0          |               | 12.48    | 11.3     |
| Specific Conductance (uS/cm) | 5280       | 5930       | 6060       | 3350     | 3350          |               | 4200     | 11200    |
| Temperature (C)              | 18         | 17.5       | 9          | 6        | 6             |               | 10.5     | 18       |
| Dissolved Oxygen             | 6.1        | NA         | NA         | NA       | 6.5           |               | 8.6      | 5.6      |
| Dissolved Inorganic Carbon   | 4.0/4.0    | NA         | NA         | NA       | 8.2           | 7.6           | NA       | NA       |
| Alkalinity (as CaCO3)        | 230        | NA         | 191        | 240      | 280           | 270           | 191/190  | 192      |
| Sulphide                     | 0.9        | NA         | NA         | NA       | NA            | NA            | NA       | NA       |
| Total Cyanide                | NA         | NA         | NA         | NA       | 0.04          | 0.025         | NA       | NA       |
| Bromide                      | <2.0/2.0   | <1         | <5         | <1       | <0.5          | <0.5          | NA       | <5       |
| Chloride                     | 1620       | 1620       | 2400       | 1210     | 1220          | 1200          | NA       | 4100     |
| Fluoride                     | <0.5       | 1.0        | <2         | 1.0      | 1.1           | 0.9           | NA       | <1       |
| Sulphate                     | 580        | 530        | 640        | 600      | 560           | 560           | NA       | 480      |
| Ammonia-N                    | NA         | NA         | NA         | NA       | NA            | NA            | NA       | NA       |
| Nitrate-N                    | <0.05      | 0.25       | <1         | 0.2      | 0.60          | 0.60          | NA       | <1       |
| Total Kjeldahl Nitrogen      | 5.8        | NA         | 4.2/4.2    | 3.8      | 2.2           | 1.89          | 3.6/3.5  | 2.4      |
| Total Phosphorus             | NA         | NA         | 0.003      | 0.011    | 0.001         | 0.009         | 0.007    | 0.01     |
| Dissolved Organic Carbon     | 11         | 14.0       | 10.0       | 7.5      | 8.2           | 7.6           | 17       | 11.1     |
| Phenols                      | 0.041      | 0.023      | 0.022      | 0.013    | 0.052         | 0.015         | 0.015    | 0.05     |
| PCB's                        | NA         | NA         | NA         | NA       | NA            | NA            | NA       | NA       |
| Oil and Grease               | NA         | 2.0        | NA         | NA       | NA            | NA            | NA       | NA       |
| Zinc                         | 0.02       | 0.02/0.02  | NA         | NA       | 0.02          | 0.02/0.01     | NA       | NA       |
| Cadmium                      | 0.0002     | <0.0002    | NA         | NA       | <0.005        | <0.005        | NA       | NA       |
| Manganese                    | 0.24/0.23  | 0.23/0.23  | NA         | NA       | 0.24          | 0.25/0.26     | NA       | NA       |
| Cobalt                       | 0.04       | 0.06/0.06  | NA         | NA       | <0.01         | <0.01         | NA       | NA       |
| Copper                       | 0.008      | 0.01       | NA         | NA       | 0.01          | 0.008         | NA       | NA       |
| Iron                         | 1.42       | 0.56       | NA         | NA       | 0.32          | 0.34/0.36     | NA       | NA       |
| Lead                         | <0.05      | <0.05      | NA         | NA       | <0.05         | <0.05         | NA       | NA       |
| Chromium                     | 0.05/0.06  | 0.07/0.07  | NA         | NA       | 0.06          | 0.06/0.06     | NA       | NA       |
| Nickel                       | 0.02/0.02  | 0.04/0.04  | NA         | NA       | 0.03          | 0.03/0.02     | NA       | NA       |
| Beryllium                    | <0.01      | NA         | NA         | <0.01    | <0.01         | <0.01         | NA       | NA       |
| Molybdenum                   | 0.06       | NA         | NA         | 0.06     | 0.08          | 0.8           | NA       | NA       |
| Calcium                      | 1040       | NA         | 1700       | 930      | 850           | 890           | 1250     | NA       |
| Vanadium                     | 0.05       | NA         | 4.7        | 0.05     | 0.05          | 0.05          | NA       | NA       |
| Aluminum                     | 0.68       | NA         | NA         | 0.68     | 0.8           | 0.84          | NA       | NA       |
| Magnesium                    | 3.0        | NA         | 4.7        | 5.2      | 5.2           | 5.2           | 2        | NA       |
| Barium                       | 0.21       | NA         | NA         | 0.15     | 0.12          | 0.12          | NA       | NA       |
| Potassium                    | 110        | NA         | 112        | 102      | 84            | 84            | 125      | NA       |
| Strontium                    | 3.8        | NA         | NA         | 3.2      | 3             | 3             | NA       | NA       |
| Sodium                       | 55         | NA         | 65         | 47       | 47            | 48            | 56       | NA       |
| Mercury (ug/L)               | NA         | NA         | NA         | NA       | NA            | NA            | NA       | NA       |
| Arsenic (ug/L)               | NA         | NA         | NA         | NA       | NA            | NA            | NA       | NA       |
| Selenium (ug/L)              | NA         | NA         | NA         | NA       | NA            | NA            | NA       | NA       |

NOTE: All Units are in (mg/L) unless otherwise specified  
NA Not Analyzed

| SURFACE WATER SITE       | SW-5       | SW-5       | SW-5       | SW-5     | SW-5<br>Rep 1 | SW-5<br>Rep 2 | SW-5     | SW-5     |
|--------------------------|------------|------------|------------|----------|---------------|---------------|----------|----------|
| Sample Date (mm/dd/yy)   | 08/13/88   | 09/24/88   | 10/22/88   | 12/02/88 | 04/11/89      | 04/11/89      | 05/12/89 | 06/16/89 |
| BAS Reference Number     | 8808067-07 | 8809202-05 | 8810139-05 |          | 8904077-06    | 8904077-07    | 8905083  | 8906104  |
| Sampling Level           | 2          | 1          | 2          | 1        | 2             | 2             | 1        | 1        |
| PAHs (ug/L)              |            |            |            |          |               |               |          |          |
| Naphthalene              | 2.1        | NA         | 270        | NA       | 39            | 37            | NA       | NA       |
| Acenaphthalene           | 0.013      | NA         | 0.3        | NA       | 0.4           | 0.4           | NA       | NA       |
| Acenaphene               | 0.41       | NA         | 0.9        | NA       | 1.4           | 1.3           | NA       | NA       |
| Fluorene                 | 0.57       | NA         | 0.8        | NA       | 1.0           | 1.0           | NA       | NA       |
| Phenanthrene             | 1.05       | NA         | 1.6        | NA       | 2.5           | 2.4           | NA       | NA       |
| Anthracene               | 0.15       | NA         | <0.1       | NA       | 0.3           | 0.3           | NA       | NA       |
| Fluoranthene             | 0.55       | NA         | 0.7        | NA       | 0.9           | 0.8           | NA       | NA       |
| Pyrene                   | 0.41       | NA         | 0.4        | NA       | 0.6           | 0.6           | NA       | NA       |
| Benzo(a)anthracene       | <0.02      | NA         | <0.1       | NA       | <0.1          | <0.1          | NA       | NA       |
| Chrysene                 | 0.02       | NA         | <0.1       | NA       | <0.1          | <0.1          | NA       | NA       |
| Benzo(b)fluoranthene     | <0.05      | NA         | <0.1       | NA       | <0.1          | <0.1          | NA       | NA       |
| Benzo(k)fluoranthene     | <0.05      | NA         | *          | NA       | <0.1          | <0.1          | NA       | NA       |
| Benzo(a)pyrene           | <0.05      | NA         | <0.1       | NA       | <0.1          | <0.1          | NA       | NA       |
| Perylene                 | <0.05      | NA         | <0.1       | NA       | <0.1          | <0.1          | NA       | NA       |
| Indelol(1,2,3-c,d)pyrene | <0.1       | NA         | <0.1       | NA       | <0.1          | <0.1          | NA       | NA       |
| Dibenzo(a,h)anthracene   | <0.02      | NA         | <0.1       | NA       | <0.5          | <0.5          | NA       | NA       |
| Benzo(g,h,i)perylene     | <0.02      | NA         | <0.1       | NA       | <0.5          | <0.5          | NA       | NA       |
| Total PAHs**             | NA         | NA         | 274.7      | NA       | 46.1          | 43.8          | NA       | NA       |
| Benzene                  | NA         | NA         | 3.5        | NA       | NA            | NA            | NA       | NA       |
| Toluene                  | NA         | NA         | <1         | NA       | NA            | NA            | NA       | NA       |
| Xylenes                  | NA         | NA         | 3          | NA       | NA            | NA            | NA       | NA       |
| Total BTX**              | NA         | NA         | 6.5        | NA       | NA            | NA            | NA       | NA       |

\* The result for Benzo (b) fluorcenthene includes the combined concentration of both Benzo (b) plus Benzo (k) fluorcenthene.

\*\* Positive values only

| SURFACE WATER SITE           | SW-6       | SW-6     | SW-6     | SW-6       | SW-6<br>Trip Blank | SW-6       |
|------------------------------|------------|----------|----------|------------|--------------------|------------|
| Sample Date (mm/dd/yy)       | 08/13/88   | 09/24/88 | 10/22/88 | 12/02/88   | 12/02/88           | 04/11/89   |
| BAS Reference Number         | 8808067-04 |          |          | 8812017-06 | 8812017-07         | 8904077-08 |
| Sampling Level               | 1          | 1        | 1        | 1          | 1                  | 2          |
| pH                           | 8.9        | NA       | NA       | 8.9        |                    | 11.4       |
| Specific Conductance (uS/cm) | 6330       | NA       | NA       | 1912       |                    | 2100       |
| Temperature (C)              | 22.5       | NA       | NA       | 4.5        |                    | 5          |
| Dissolved Oxygen             | 4.5        | NA       | NA       | 4.1        |                    | NA         |
| Dissolved Inorganic Carbon   | NA         | NA       | NA       | NA         | NA                 | NA         |
| Alkalinity (as CaCO3)        | NA         | NA       | NA       | 59         | 2/2                | 84         |
| Sulphide                     | NA         | NA       | NA       | NA         | NA                 | NA         |
| Total Cyanide                | NA         | NA       | NA       | NA         | NA                 | 0.004      |
| Bromide                      | <2.0       | NA       | NA       | <1         | <0.5               | <0.5       |
| Chloride                     | 2200       | NA       | NA       | 700        | <0.01              | 1010       |
| Fluoride                     | 1.0        | NA       | NA       | 1.0        | <0.01              | 0.5        |
| Sulphate                     | 210/230    | NA       | NA       | 168        | <0.2               | 130        |
| Ammonia-N                    | NA         | NA       | NA       | NA         | NA                 | NA         |
| Nitrate-N                    | 2.5        | NA       | NA       | <0.2       | <0.01              | 0.1        |
| Total Kjeldahl Nitrogen      | NA         | NA       | NA       | 2.2        | <0.05              | 2.1        |
| Total Phosphorus             | NA         | NA       | NA       | 0.014      | <0.001             | 0.006      |
| Dissolved Organic Carbon     | 9.0        | NA       | NA       | 7.0        | <0.5               | 10.8       |
| Phenols                      | 0.6        | NA       | NA       | 0.57       | <0.001             | 1.7        |
| PCB's                        | NA         | NA       | NA       | NA         | NA                 | NA         |
| Oil and Grease               | 5.0        | NA       | NA       | NA         | NA                 | NA         |
| Zinc                         | 0.02       | NA       | NA       | NA         | NA                 | 0.03       |
| Cadmium                      | 0.0008     | NA       | NA       | NA         | NA                 | <0.005     |
| Manganese                    | 0.1        | NA       | NA       | NA         | NA                 | 0.1        |
| Cobalt                       | 0.04       | NA       | NA       | NA         | NA                 | <0.01      |
| Copper                       | 0.005      | NA       | NA       | NA         | NA                 | 0.01       |
| Iron                         | 0.14       | NA       | NA       | NA         | NA                 | 0.38       |
| Lead                         | <0.05      | NA       | NA       | NA         | NA                 | <0.05      |
| Chromium                     | 0.06       | NA       | NA       | NA         | NA                 | 0.03       |
| Nickel                       | 0.02       | NA       | NA       | NA         | NA                 | 0.01       |
| Beryllium                    | NA         | NA       | NA       | <0.01      | <0.01              | <0.01      |
| Molybdenum                   | NA         | NA       | NA       | 0.02       | <0.02              | 0.04       |
| Calcium                      | NA         | NA       | NA       | 430        | <0.05              | 560        |
| Vanadium                     | NA         | NA       | NA       | 0.03       | <0.01              | 0.04       |
| Aluminum                     | NA         | NA       | NA       | 0.34       | <0.05              | 0.76       |
| Magnesium                    | NA         | NA       | NA       | 12.3       | <0.05              | 1.55       |
| Barium                       | NA         | NA       | NA       | 0.14       | <0.01              | 0.17       |
| Potassium                    | NA         | NA       | NA       | 32         | <0.05              | 36         |
| Strontium                    | NA         | NA       | NA       | 1.63       | <0.01              | 2          |
| Sodium                       | NA         | NA       | NA       | 47         | <0.5               | 40         |
| Mercury (ug/L)               | NA         | NA       | NA       | NA         | NA                 | NA         |
| Arsenic (ug/L)               | NA         | NA       | NA       | NA         | NA                 | NA         |
| Selenium (ug/L)              | NA         | NA       | NA       | NA         | NA                 | NA         |

NOTE: All Units are in (mg/L) unless otherwise specified  
NA Not Analyzed

| SURFACE WATER SITE       | SW-6       | SW-6     | SW-6     | SW-6       | SW-6       | SW-6       |
|--------------------------|------------|----------|----------|------------|------------|------------|
| Sample Date (mm/dd/yy)   | 08/13/88   | 09/24/88 | 10/22/88 | 12/02/88   | 12/02/88   | 04/11/89   |
| BAS Reference Number     | 8808067-04 |          |          | 8812017-06 | 8812017-07 | 8904077-08 |
| Sampling Level           | 1          | 1        | 1        | 1          | 1          | 2          |
| PAH's (ug/L)             |            |          |          |            |            |            |
| Naphthalene              | NA         | NA       | NA       | NA         | NA         | 70         |
| Acenaphthalene           | NA         | NA       | NA       | NA         | NA         | 18         |
| Acenaphene               | NA         | NA       | NA       | NA         | NA         | 160        |
| Fluorene                 | NA         | NA       | NA       | NA         | NA         | 76         |
| Phenanthrene             | NA         | NA       | NA       | NA         | NA         | 96         |
| Anthracene               | NA         | NA       | NA       | NA         | NA         | 12         |
| Fluoranthene             | NA         | NA       | NA       | NA         | NA         | 13         |
| Pyrene                   | NA         | NA       | NA       | NA         | NA         | 9.1        |
| Benzo(a)anthracene       | NA         | NA       | NA       | NA         | NA         | 0.4        |
| Chrysene                 | NA         | NA       | NA       | NA         | NA         | 0.4        |
| Benzo(b)fluoranthene     | NA         | NA       | NA       | NA         | NA         | 0.1        |
| Benzo(k)fluoranthene     | NA         | NA       | NA       | NA         | NA         | 0.1        |
| Benzo(a)pyrene           | NA         | NA       | NA       | NA         | NA         | 0.2        |
| Perylene                 | NA         | NA       | NA       | NA         | NA         | <0.1       |
| Indelol(1,2,3-c,d)pyrene | NA         | NA       | NA       | NA         | NA         | <0.1       |
| Dibenzo(a,h)anthracene   | NA         | NA       | NA       | NA         | NA         | <0.5       |
| Benzo(g,h,i)perylene     | NA         | NA       | NA       | NA         | NA         | <0.5       |
| Total PAH's**            | NA         | NA       | NA       | NA         | NA         | 455.3      |

\*\* Positive values only

## SURFACE WATER SITE

SW-7

Sample Date (mm/dd/yy) 08/13/88  
BAS Reference Number 8808067-07  
Sampling Level 1

pH 7.7  
Specific Conductance (uS/cm) 145  
Temperature (C) 17  
Dissolved Oxygen NA

Dissolved Inorganic Carbon NA  
Alkalinity (as CaCO<sub>3</sub>) NA  
Sulphide NA  
Total Cyanide NA  
Bromide <0.1  
Chloride 12.4/12.6  
Fluoride 0.06/0.10  
Sulphate 11.1/11.5  
Ammonia-N NA  
Nitrate-N 0.70/0.72  
Total Kjeldahl Nitrogen NA  
Total Phosphorus NA

Dissolved Organic Carbon 3.5  
Phenols 0.011  
PCB's NA  
Oil and Grease 2.0

Zinc 0.05  
Cadmium 0.0004  
Manganese 0.05  
Cobalt <0.01  
Copper <0.005  
Iron 0.6  
Lead <0.05  
Chromium <0.01  
Nickel <0.01  
Beryllium NA  
Molybdenum NA  
Calcium NA  
Vanadium NA  
Aluminum NA  
Magnesium NA  
Barium NA  
Potassium NA  
Strontium NA  
Sodium NA  
Mercury (ug/L) NA  
Arsenic (ug/L) NA  
Selenium (ug/L) NA

NOTE: All Units are in (mg/L) unless otherwise s  
NA Not Analyzed

## SURFACE WATER SITE

SW-8

Sample Date (mm/dd/yy) 06/16/89  
BAS Reference Number 8906104  
Sampling Level 2

pH 8.9  
Specific Conductance (uS/cm) 48  
Temperature (C) 15  
Dissolved Oxygen 9.2

Dissolved Inorganic Carbon NA  
Alkalinity (as CaCO3) 39  
Sulphide NA  
Total Cyanide 0.003  
Bromide <0.2  
Chloride 136  
Fluoride <0.05  
Sulphate 26  
Ammonia-N NA  
Nitrate-N 0.4  
Total Kjeldahl Nitrogen 0.64  
Total Phosphorus 0.004

Dissolved Organic Carbon 6.9  
Phenols 0.008  
PCB's NA  
Oil and Grease NA

Zinc NA  
Cadmium NA  
Manganese NA  
Cobalt NA  
Copper NA  
Iron NA  
Lead NA  
Chromium NA  
Nickel NA  
Beryllium NA  
Molybdenum NA  
Calcium NA  
Vanadium NA  
Aluminum NA  
Magnesium NA  
Barium NA  
Potassium NA  
Strontium NA  
Sodium NA  
Mercury (ug/L) NA  
Arsenic (ug/L) NA  
Selenium (ug/L) NA

NOTE: All Units are in (mg/L) unless otherwise s  
NA Not Analyzed



## SURFACE WATER SITE

SW-8

Sample Date (mm/dd/yy)  
BAS Reference Number  
Sampling Level

06/16/89  
8906104  
2

## PAHs (ug/L)

|                          |      |
|--------------------------|------|
| Naphthalene              | <0.1 |
| Acenaphthalene           | <0.1 |
| Acenaphene               | 0.8  |
| Fluorene                 | 0.2  |
| Phenanthrene             | 0.2  |
| Anthracene               | <0.1 |
| Fluoranthene             | 0.1  |
| Pyrene                   | 0.3  |
| Benzo(a)anthracene       | <0.2 |
| Chrysene                 | <0.2 |
| Benzo(b)fluoranthene     | <0.2 |
| Benzo(k)fluoranthene     | <0.2 |
| Benzo(a)pyrene           | <0.5 |
| Perylene                 | <0.5 |
| Indelol(1,2,3-c,d)pyrene | <0.5 |
| Dibenzo(a,h)anthracene   | <0.5 |
| Benzo(g,h,i)perylene     | <0.5 |

Total PAHs\*\* 1.6

|         |    |
|---------|----|
| Benzene | NA |
| Toluene | NA |
| Xylenes | NA |

\*\* Positive values only

## SURFACE WATER SITE

SW-9

Sample Date (mm/dd/yy) 06/16/89  
BAS Reference Number 8906104  
Sampling Level 2

pH 9.1  
Specific Conductance (uS/cm) 49  
Temperature (C) 15  
Dissolved Oxygen 9.6

Dissolved Inorganic Carbon NA  
Alkalinity (as CaCO<sub>3</sub>) 37  
Sulphide NA  
Total Cyanide <0.002  
Bromide <0.2  
Chloride 145  
Fluoride <0.05  
Sulphate 24  
Ammonia-N NA  
Nitrate-N 0.48  
Total Kjeldahl Nitrogen 0.58/0.62  
Total Phosphorus 0.007

Dissolved Organic Carbon 5.6/5.3  
Phenols 0.002  
PCB's NA  
Oil and Grease NA

Zinc NA  
Cadmium NA  
Manganese NA  
Cobalt NA  
Copper NA  
Iron NA  
Lead NA  
Chromium NA  
Nickel NA  
Beryllium NA  
Molybdenum NA  
Calcium NA  
Vanadium NA  
Aluminum NA  
Magnesium NA  
Barium NA  
Potassium NA  
Strontium NA  
Sodium NA  
Mercury (ug/L) NA  
Arsenic (ug/L) NA  
Selenium (ug/L) NA

NOTE: All Units are in (mg/L) unless otherwise s  
NA Not Analyzed

## SURFACE WATER SITE

SW-9

Sample Date (mm/dd/yy) 06/16/89  
BAS Reference Number 8906104  
Sampling Level 2

## PAHs (ug/L)

|                          |      |
|--------------------------|------|
| Naphthalene              | <0.1 |
| Acenaphthalene           | <0.1 |
| Acenaphene               | 0.1  |
| Fluorene                 | 0.1  |
| Phenanthrene             | 0.2  |
| Anthracene               | <0.1 |
| Fluoranthene             | 0.9  |
| Pyrene                   | 0.6  |
| Benzo(a)anthracene       | <0.2 |
| Chrysene                 | <0.2 |
| Benzo(b)fluoranthene     | <0.2 |
| Benzo(k)fluoranthene     | <0.2 |
| Benzo(a)pyrene           | <0.5 |
| Perylene                 | <0.5 |
| Indelol(1,2,3-c,d)pyrene | <0.5 |
| Dibenzo(a,h)anthracene   | <0.5 |
| Benzo(g,h,i)perylene     | <0.5 |

Total PAHs\*\* 1.9

|         |    |
|---------|----|
| Benzene | NA |
| Toluene | NA |
| Xylenes | NA |

Total BTX\*\* NA

\*\* Positive values only

CONCENTRATION OF VOLATILE PRIORITY POLLUTANTS IN WATER  
ug/L

| COMPOUND                   | SW1 | SW2 | SW5 | BLANK | MDL |
|----------------------------|-----|-----|-----|-------|-----|
| BENZENE                    | -   | -   | 5.6 | -     | 1   |
| BROMODICHLOROMETHANE       | -   | -   | -   | -     | 1   |
| BROMOFORM                  | -   | -   | -   | -     | 2   |
| BROMOMETHANE               | -   | -   | -   | -     | 16  |
| CARBON TETRACHLORIDE       | -   | -   | -   | -     | 2   |
| CHLOROBENZENE              | -   | -   | -   | -     | 1   |
| CHLOROETHANE               | -   | -   | -   | -     | 10  |
| 2-CHLOROETHYL VINYL ETHER  | -   | -   | -   | -     | 10  |
| CHLOROFORM                 | -   | -   | -   | -     | 1   |
| CHLOROMETHANE              | -   | -   | -   | -     | 50  |
| DIBROMOCHLOROMETHANE       | -   | -   | -   | -     | 1   |
| 1,2-DICHLOROBENZENE        | -   | -   | -   | -     | 1   |
| 1,3-DICHLOROBENZENE        | -   | -   | -   | -     | 1   |
| 1,4-DICHLOROBENZENE        | -   | -   | -   | -     | 1   |
| 1,1-DICHLOROETHYLENE       | -   | -   | -   | -     | 1   |
| 1,1-DICHLOROETHANE         | -   | -   | -   | -     | 1   |
| 1,2-DICHLOROETHANE         | -   | -   | -   | -     | 2   |
| TRANS-1,2-DICHLOROETHYLENE | -   | -   | -   | -     | 1   |
| DICHLOROMETHANE            | -   | -   | -   | -     | 15  |
| 1,2-DICHLOROPROPANE        | -   | -   | -   | -     | 1   |
| CIS-1,3-DICHLOROPROPENE    | -   | -   | -   | -     | 1   |
| TRANS-1,3-DICHLOROPROPENE  | -   | -   | -   | -     | 1   |
| ETHYLBENZENE               | -   | -   | -   | -     | 1   |
| A-METHYLSTYRENE            | -   | -   | -   | -     | 1   |
| METHYLSTYRENE ISOMERS      | -   | -   | -   | -     | 1   |
| MESITYLENE                 | -   | -   | -   | -     | 1   |
| 1,1,2,2-TETRACHLOROETHANE  | -   | -   | -   | -     | 2   |
| TETRACHLOROETHYLENE        | 1.4 | 1.7 | 1   | -     | 1   |
| TOLUENE                    | -   | -   | 4.8 | -     | 2   |
| 1,1,1-TRICHLOROETHANE      | -   | -   | -   | -     | 2   |
| 1,1,2-TRICHLOROETHANE      | -   | -   | -   | -     | 1   |
| TRICHLOROETHYLENE          | -   | -   | -   | -     | 1   |
| TRICHLOROFLUOROMETHANE     | -   | -   | -   | -     | 2   |
| M+P-XYLENE                 | -   | -   | 1.1 | -     | 2   |
| O-XYLENE                   | -   | -   | TR  | -     | 1   |
| VINYL CHLORIDE             | -   | -   | -   | -     | 12  |
| METHYL ETHYL KETONE        | -   | -   | -   | -     | 20  |
| CUMEN                      | -   | -   | -   | -     | 1   |
| PROPYL BENZENE             | -   | -   | -   | -     | 1   |
| M+P-ETHYL TOLUENE          | -   | -   | -   | -     | 1   |
| O-ETHYL TOLUENE            | -   | -   | -   | -     | 1   |
| DIBROMOETHANE              | -   | -   | -   | -     | 5   |
| CIS-1,2-DICHLOROETHYLENE   | -   | -   | -   | -     | 1   |
| STYRENE                    | -   | -   | -   | -     | 2   |
| OTHER AROMATIC COMPOUNDS   | -   | -   | 6.3 | -     | 1   |

MDL = METHOD DETECTION LIMITS

TR - TRACE

OTHER AROMATIC COMPOUNDS = Total concentration of trimethylbenzenes  
using the response factor of mesitylene.

CONCENTRATION OF ACIDIC PRIORITY POLLUTANTS IN WATER  
ug/L

| COMPOUND                   | SW 1 | BLANK | MDL |
|----------------------------|------|-------|-----|
| PHENOL                     | -    | -     | 1   |
| 2-CHLOROPHENOL             | -    | -     | 1   |
| 2,4-DIMETHYLPHENOL         | -    | -     | 1   |
| 4-CHLORO-3-METHYLPHENOL    | -    | -     | 1   |
| 2,4-DICHLOROPHENOL         | -    | -     | 1   |
| 2,4,6-TRICHLOROPHENOL      | -    | -     | 1   |
| 2-NITROPHENOL              | -    | -     | 2   |
| 2,4-DINITROPHENOL          | -    | -     | 100 |
| 2-METHYL-4,6-DINITROPHENOL | -    | -     | 25  |
| 4-NITROPHENOL              | -    | -     | 100 |
| PENTACHLOROPHENOL          | -    | -     | 1   |
| 2,6-DICHLOROPHENOL         | -    | -     | 1   |
| 2,3,4-TRICHLOROPHENOL      | -    | -     | 1   |
| 2,3,5-TRICHLOROPHENOL      | -    | -     | 1   |
| 2,4,5-TRICHLOROPHENOL      | -    | -     | 1   |
| 2,3,4,5-TETRACHLOROPHENOL  | -    | -     | 1   |
| 2,3,4,6-TETRACHLOROPHENOL  | -    | -     | 1   |
| 2,3,5,6-TETRACHLOROPHENOL  | -    | -     | 1   |
| M-CRESOL                   | -    | -     | 1   |
| P-CRESOL                   | -    | -     | 1   |
| O-CRESOL                   | -    | -     | 1   |
| OTHER DIMETHYL PHENOLS     | -    | -     | 1   |
| TRIMETHYL PHENOLS          | -    | -     | 1   |

MDL = METHOD DETECTION LIMIT

RECOVERY OF SURROGATE STANDARDS  
(%)

| COMPOUND                 | SW 1 | BLANK |
|--------------------------|------|-------|
| D5-PHENOL                | 92.5 | 100   |
| TRIFLUOROMETHYL-M-CRESOL | 94.8 | 100   |

# Free Product and Bennett Creek Sediment Sample Concentrations

|                           | Free Product | Bennett<br>Creek Sediment |
|---------------------------|--------------|---------------------------|
| Sample Date (mm/dd/yy)    | 05/12/89     | 06/19/89                  |
| BAS Reference Number      | 8905085      | 8905084                   |
| PAHs                      |              |                           |
| Naphthalene               | 40000        | 94/110                    |
| Acenaphthalene            | 3100         | 64/15                     |
| Acenaphthene              | 4700         | 240/220                   |
| Fluorene                  | 3000         | 190/180                   |
| Phenanthrene              | 1500         | 115/100                   |
| Anthracene                | 16000        | 150/290                   |
| Fluoranthene              | 2600         | 320/290                   |
| Pyrene                    | 2300         | 280/260                   |
| Benzo(a)anthracene        | 14000        | 73/70                     |
| Chrysene                  | 8200         | 53/100                    |
| Benzo(b)fluoranthene      | 14000        | 79/72                     |
| Benzo(k)fluoranthene      | 7800         | 46/44                     |
| Benzo(a)pyrene            | 21000        | 120/110                   |
| Perylene                  | 3800         | 23/20                     |
| Indelol(1,2,3-c,d)pyrene  | 1300         | 7.7/7.1                   |
| Dibenzo(a,h)anthracene    | 3200         | 21/20                     |
| Benzo(g,h,i)perylene      | 6300         | 41/36                     |
| Loss on Ignition          | NA           | 1.0                       |
| Moisture                  | NA           | 53.6                      |
| Total PAHs*               | 152800       | 1935.4                    |
| CHLOROPHENOLS             |              |                           |
| Phenol                    | 6.0          | 4.0                       |
| o-cresol                  | <2           | NA                        |
| m-cresol                  | 3.2          | NA                        |
| p-cresol                  | 2.6          | NA                        |
| 2-Chlorophenol            | <2           | NA                        |
| 2,4-Dimethylphenol        | 4.6          | NA                        |
| 2,6-Dichlorophenol        | <2           | NA                        |
| 4-Chloro-3-Methylphenol   | 49.0         | NA                        |
| 2,4-Dichlorophenol        | <2           | NA                        |
| 2,4,6-Dichlorophenol      | <2           | NA                        |
| 4-nitrophenol             | 2700         | NA                        |
| 2,3,5-Trichlorophenol     | <2           | NA                        |
| 2,4,5-Trichlorophenol     | <2           | NA                        |
| 2,3,4-Trichlorophenol     | <2           | NA                        |
| 2,3,5,6-Tetrachlorophenol | <2           | NA                        |
| 2,4-Dinitrophenol         | 38           | NA                        |
| 2,3,4,6-Tetrachlorophenol | <2           | NA                        |
| 2,3,4,5-Tetrachlorophenol | <2           | NA                        |
| 4,6-Dinitro-o-cresol      | 60           | NA                        |
| Pentachlorophenol         | <2           | NA                        |
| Total Chlorophenols*      | 2863.4       | 4.0                       |

NOTE : All units in ug/g unless otherwise noted

\* Positive values only

NA Not Analyzed

TABLE A11.2: REGRESSION ANALYSIS BETWEEN REPLICATE SAMPLES  
COLLECTED AT SW3 AND SW5

| Station | Y Intercept | R <sup>2</sup> | Slope | St. Error<br>of Slope | Degree<br>of Freedom |
|---------|-------------|----------------|-------|-----------------------|----------------------|
| SW3     | 0.103       | 0.992          | 1.054 | 0.021                 | 15                   |
| SW5     | 0.104       | 0.999          | 1.003 | 0.005                 | 29                   |

**APPENDIX 12**

**SURFACE WATER QUALITY SUMMARY STATISTICS**



Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|--------|--------|----------|---------|---------|
| PH        | pHu   | 40 | 40 | 8.60   | 8.00   | 1.61     | 12.5    | 6.50    |
| SC        | us/c  | 39 | 39 | 1843   | 171    | 2520     | 11200   | 44.8    |
| Temp      | DegC  | 40 | 39 | 11.4   | 11.0   | 6.75     | 23.5    | 1.00    |
| DO        | mg/L  | 22 | 22 | 9.05   | 8.50   | 3.20     | 16.4    | 4.10    |
| DIC       | mg/L  | 5  | 5  | 9.84   | 8.20   | 6.00     | 18.0    | 4.00    |
| ALK       | mg/L  | 31 | 31 | 72.0   | 37.0   | 76.9     | 280     | 16.0    |
| SO3       | mg/L  | 3  | 1  | 0.900  |        |          | 0.900   | 0.900   |
| TC        | mg/L  | 9  | 7  | 0.0083 | 0.0030 | 0.0140   | 0.0400  | 0.0020  |
| Br        | mg/L  | 35 | 2  | 1.30   |        |          | 2.00    | 0.600   |
| Cl        | mg/L  | 35 | 35 | 660    | 19.8   | 940      | 4100    | 4.50    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PH        | pHu   | 7 | 7  | 7.24   | 7.50   | 0.541    | 7.80    | 6.50    |
| SC        | us/c  | 7 | 7  | 135    | 101    | 84.6     | 321     | 80.0    |
| Temp      | DegC  | 7 | 6  | 12.3   | 13.2   | 7.83     | 23.5    | 1.00    |
| DO        | mg/L  | 4 | 4  | 11.4   | 10.5   | 3.83     | 16.4    | 8.00    |
| DIC       | mg/L  | 1 | 1  | 18.0   |        |          | 18.0    | 18.0    |
| ALK       | mg/L  | 6 | 6  | 32.7   | 25.5   | 16.0     | 64.0    | 22.0    |
| SO3       | mg/L  | 1 | 0  |        |        |          |         |         |
| TC        | mg/L  | 2 | 2  | 0.0035 |        |          | 0.0040  | 0.0030  |
| Br        | mg/L  | 6 | 0  |        |        |          |         |         |
| Cl        | mg/L  | 6 | 6  | 10.4   | 9.00   | 4.58     | 18.2    | 6.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| PH        | pHu   | 7 | 7  | 7.62 | 7.90   | 0.469    | 8.00    | 6.75    |
| SC        | us/c  | 6 | 6  | 79.0 | 66.0   | 46.1     | 171     | 44.8    |
| Temp      | DegC  | 7 | 7  | 10.1 | 9.00   | 7.65     | 21.5    | 1.00    |
| DO        | mg/L  | 3 | 3  | 11.4 | 11.0   | 3.22     | 14.8    | 8.40    |
| DIC       | mg/L  | 1 | 1  | 14.0 |        |          | 14.0    | 14.0    |
| ALK       | mg/L  | 6 | 6  | 25.3 | 19.5   | 13.7     | 52.0    | 16.0    |
| SO3       | mg/L  | 1 | 0  |      |        |          |         |         |
| TC        | mg/L  | 1 | 0  |      |        |          |         |         |
| Br        | mg/L  | 6 | 0  |      |        |          |         |         |
| Cl        | mg/L  | 6 | 6  | 7.79 | 6.40   | 3.70     | 13.8    | 4.50    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PH        | pHu   | 6 | 6  | 8.26   | 8.20   | 1.02     | 9.97    | 6.80    |
| SC        | us/c  | 6 | 6  | 133    | 86.5   | 103      | 337     | 69.0    |
| Temp      | DegC  | 6 | 6  | 8.50   | 8.00   | 6.13     | 18.0    | 1.50    |
| DO        | mg/L  | 3 | 3  | 11.3   | 12.6   | 2.79     | 13.2    | 8.10    |
| DIC       | mg/L  | 1 | 1  | 5.00   |        |          | 5.00    | 5.00    |
| ALK       | mg/L  | 4 | 4  | 30.2   | 32.0   | 4.19     | 33.0    | 24.0    |
| SO3       | mg/L  | 0 | 0  |        |        |          |         |         |
| TC        | mg/L  | 1 | 1  | 0.0020 |        |          | 0.0020  | 0.0020  |
| Br        | mg/L  | 5 | 0  |        |        |          |         |         |
| Cl        | mg/L  | 5 | 5  | 14.1   | 13.8   | 3.65     | 19.8    | 10.1    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PH        | pHu   | 7 | 7  | 7.97   | 7.80   | 0.895    | 9.40    | 6.56    |
| SC        | us/c  | 7 | 7  | 2813   | 2620   | 872      | 4220    | 1760    |
| Temp      | DegC  | 7 | 7  | 12.1   | 12.5   | 7.73     | 23.0    | 1.50    |
| DO        | mg/L  | 4 | 4  | 7.85   | 8.10   | 1.03     | 8.80    | 6.40    |
| DIC       | mg/L  | 0 | 0  |        |        |          |         |         |
| ALK       | mg/L  | 5 | 5  | 44.1   | 40.0   | 9.59     | 60.0    | 36.5    |
| SO3       | mg/L  | 0 | 0  |        |        |          |         |         |
| TC        | mg/L  | 1 | 1  | 0.0020 |        |          | 0.0020  | 0.0020  |
| Br        | mg/L  | 6 | 1  | 0.600  |        |          | 0.600   | 0.600   |
| Cl        | mg/L  | 6 | 6  | 1093   | 1218   | 436      | 1460    | 270     |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PH        | pHu   | 7 | 7  | 11.4   | 11.3   | 0.503    | 12.5    | 11.0    |
| SC        | us/c  | 7 | 7  | 5624   | 5280   | 2704     | 11200   | 3350    |
| Temp      | DegC  | 7 | 7  | 12.1   | 10.5   | 5.56     | 18.0    | 6.00    |
| DO        | mg/L  | 4 | 4  | 6.70   | 6.30   | 1.32     | 8.60    | 5.60    |
| DIC       | mg/L  | 2 | 2  | 6.10   |        |          | 8.20    | 4.00    |
| ALK       | mg/L  | 6 | 6  | 221    | 211    | 36.3     | 280     | 191     |
| SO3       | mg/L  | 1 | 1  | 0.900  |        |          | 0.900   | 0.900   |
| TC        | mg/L  | 1 | 1  | 0.0400 |        |          | 0.0400  | 0.0400  |
| Br        | mg/L  | 6 | 1  | 2.00   |        |          | 2.00    | 2.00    |
| Cl        | mg/L  | 6 | 6  | 2028   | 1620   | 1103     | 4100    | 1210    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PH        | pHu   | 3 | 3  | 9.73   | 8.90   | 1.44     | 11.4    | 8.90    |
| SC        | us/c  | 3 | 3  | 3447   | 2100   | 2498     | 6330    | 1912    |
| Temp      | DegC  | 3 | 3  | 10.7   | 5.00   | 10.3     | 22.5    | 4.50    |
| DO        | mg/L  | 2 | 2  | 4.30   |        |          | 4.50    | 4.10    |
| DIC       | mg/L  | 0 | 0  |        |        |          |         |         |
| ALK       | mg/L  | 2 | 2  | 71.5   |        |          | 84.0    | 59.0    |
| SO3       | mg/L  | 0 | 0  |        |        |          |         |         |
| TC        | mg/L  | 1 | 1  | 0.0040 |        |          | 0.0040  | 0.0040  |
| Br        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cl        | mg/L  | 3 | 3  | 1303   | 1010   | 792      | 2200    | 700     |

Note: N=number of observations, ND=number detected

## Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 35 | 29 | 0.405  | 0.0800 | 0.463    | 1.25    | 0.0030  |
| SO4       | mg/L  | 35 | 35 | 159    | 26.0   | 206      | 640     | 5.75    |
| NH4-N     | mg/L  | 1  | 1  | 0.500  |        |          | 0.500   | 0.500   |
| NO3-N     | mg/L  | 35 | 27 | 0.351  | 0.240  | 0.466    | 2.50    | 0.0400  |
| TkN       | mg/L  | 31 | 31 | 1.43   | 0.600  | 1.47     | 5.80    | 0.220   |
| TP        | mg/L  | 29 | 29 | 0.0113 | 0.0070 | 0.0157   | 0.0880  | 0.0010  |
| DOC       | mg/L  | 40 | 40 | 7.17   | 6.20   | 2.72     | 17.0    | 3.50    |
| Phnol     | mg/L  | 40 | 26 | 0.189  | 0.0285 | 0.373    | 1.70    | 0.0010  |
| PCB       | mg/L  | 1  | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 10 | 7  | 3.00   | 2.00   | 1.63     | 5.00    | 1.00    |

Note: N=number of observations, ND=number detected

## Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 6 | 6  | 0.0700 | 0.0600 | 0.0253   | 0.120   | 0.0500  |
| SO4       | mg/L  | 6 | 6  | 28.2   | 23.5   | 13.1     | 51.0    | 16.0    |
| NH4-N     | mg/L  | 1 | 1  | 0.500  |        |          | 0.500   | 0.500   |
| NO3-N     | mg/L  | 6 | 6  | 0.188  | 0.130  | 0.157    | 0.480   | 0.0400  |
| TkN       | mg/L  | 6 | 6  | 0.486  | 0.477  | 0.144    | 0.710   | 0.320   |
| TP        | mg/L  | 6 | 6  | 0.0087 | 0.0075 | 0.0036   | 0.0150  | 0.0060  |
| DOC       | mg/L  | 7 | 7  | 6.64   | 5.90   | 1.43     | 9.50    | 5.50    |
| Phnol     | mg/L  | 7 | 1  | 0.0060 |        |          | 0.0060  | 0.0060  |
| PCB       | mg/L  | 1 | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 2 | 1  | 1.00   |        |          | 1.00    | 1.00    |

Note: N=number of observations, ND=number detected

## Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 6 | 6  | 0.0422 | 0.0450 | 0.0277   | 0.0800  | 0.0030  |
| SO4       | mg/L  | 6 | 6  | 9.06   | 9.00   | 1.90     | 11.2    | 5.75    |
| NH4-N     | mg/L  | 0 | 0  |        |        |          |         |         |
| NO3-N     | mg/L  | 6 | 6  | 0.182  | 0.130  | 0.145    | 0.460   | 0.0700  |
| TkN       | mg/L  | 6 | 6  | 0.293  | 0.285  | 0.0408   | 0.370   | 0.260   |
| TP        | mg/L  | 5 | 5  | 0.0096 | 0.0090 | 0.0043   | 0.0160  | 0.0040  |
| DOC       | mg/L  | 7 | 7  | 6.43   | 5.80   | 1.47     | 9.00    | 5.00    |
| Phnol     | mg/L  | 7 | 1  | 0.0030 |        |          | 0.0030  | 0.0030  |
| PCB       | mg/L  | 0 | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 1 | 1  | 2.00   |        |          | 2.00    | 2.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 5 | 5  | 0.0650 | 0.0700 | 0.0173   | 0.0800  | 0.0400  |
| SO4       | mg/L  | 5 | 5  | 12.3   | 13.0   | 1.63     | 13.8    | 10.0    |
| NH4-N     | mg/L  | 0 | 0  |        |        |          |         |         |
| NO3-N     | mg/L  | 5 | 5  | 0.314  | 0.300  | 0.183    | 0.540   | 0.0450  |
| TkN       | mg/L  | 4 | 4  | 0.270  | 0.275  | 0.0374   | 0.310   | 0.220   |
| TP        | mg/L  | 4 | 4  | 0.0125 | 0.0095 | 0.0104   | 0.0270  | 0.0040  |
| DOC       | mg/L  | 6 | 6  | 5.02   | 4.75   | 1.12     | 7.00    | 4.00    |
| Phnol     | mg/L  | 6 | 4  | 0.0023 | 0.0020 | 0.0015   | 0.0040  | 0.0010  |
| PCB       | mg/L  | 0 | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 2 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 6 | 5  | 1.01   | 1.00   | 0.160    | 1.25    | 0.800   |
| SO4       | mg/L  | 6 | 6  | 216    | 218    | 44.4     | 270     | 166     |
| NH4-N     | mg/L  | 0 | 0  |        |        |          |         |         |
| NO3-N     | mg/L  | 6 | 3  | 0.183  | 0.200  | 0.0764   | 0.250   | 0.100   |
| TkN       | mg/L  | 5 | 5  | 2.20   | 1.93   | 0.728    | 3.50    | 1.80    |
| TP        | mg/L  | 5 | 5  | 0.0228 | 0.0060 | 0.0367   | 0.0880  | 0.0020  |
| DOC       | mg/L  | 7 | 7  | 6.23   | 6.00   | 0.591    | 7.50    | 5.80    |
| Phnol     | mg/L  | 7 | 7  | 0.256  | 0.270  | 0.247    | 0.720   | 0.0340  |
| PCB       | mg/L  | 0 | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 2 | 2  | 4.50   |        |          | 5.00    | 4.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 6 | 3  | 1.03   | 1.00   | 0.0577   | 1.10    | 1.00    |
| SO4       | mg/L  | 6 | 6  | 565    | 570    | 55.8     | 640     | 480     |
| NH4-N     | mg/L  | 0 | 0  |        |        |          |         |         |
| NO3-N     | mg/L  | 6 | 3  | 0.350  | 0.250  | 0.218    | 0.600   | 0.200   |
| TkN       | mg/L  | 6 | 6  | 3.66   | 3.67   | 1.31     | 5.80    | 2.20    |
| TP        | mg/L  | 5 | 5  | 0.0064 | 0.0070 | 0.0043   | 0.0110  | 0.0010  |
| DOC       | mg/L  | 7 | 7  | 11.3   | 11.0   | 3.31     | 17.0    | 7.50    |
| Phnol     | mg/L  | 7 | 7  | 0.0309 | 0.0230 | 0.0165   | 0.0520  | 0.0130  |
| PCB       | mg/L  | 0 | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 1 | 1  | 2.00   |        |          | 2.00    | 2.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| F         | mg/L  | 3 | 3  | 0.833  | 1.00   | 0.289    | 1.00    | 0.500   |
| SO4       | mg/L  | 3 | 3  | 173    | 168    | 45.2     | 220     | 130     |
| NH4-N     | mg/L  | 0 | 0  |        |        |          |         |         |
| NO3-N     | mg/L  | 3 | 1  | 2.50   |        |          | 2.50    | 2.50    |
| TkN       | mg/L  | 2 | 2  | 2.15   |        |          | 2.20    | 2.10    |
| TP        | mg/L  | 2 | 2  | 0.0100 |        |          | 0.0140  | 0.0060  |
| DOC       | mg/L  | 3 | 3  | 8.93   | 9.00   | 1.90     | 10.8    | 7.00    |
| Phnol     | mg/L  | 3 | 3  | 0.957  | 0.600  | 0.644    | 1.70    | 0.570   |
| PCB       | mg/L  | 0 | 0  |        |        |          |         |         |
| OILGRS    | mg/L  | 1 | 1  | 5.00   |        |          | 5.00    | 5.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 18 | 15 | 0.0243 | 0.0200 | 0.0112   | 0.0500  | 0.0100  |
| Cd        | mg/L  | 18 | 4  | 0.0010 | 0.0010 |          | 0.0010  | 0.0010  |
| Mn        | mg/L  | 18 | 18 | 0.242  | 0.0950 | 0.377    | 1.28    | 0.0300  |
| Co        | mg/L  | 18 | 5  | 0.0400 | 0.0400 | 0.0122   | 0.0600  | 0.0300  |
| Cu        | mg/L  | 18 | 7  | 0.0083 | 0.0100 | 0.0024   | 0.0100  | 0.0050  |
| Fe        | mg/L  | 18 | 18 | 0.835  | 0.560  | 0.767    | 3.10    | 0.140   |
| Pb        | mg/L  | 18 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 18 | 8  | 0.0494 | 0.0500 | 0.0161   | 0.0700  | 0.0300  |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 3 | 1  | 0.0200 |        |          | 0.0200  | 0.0200  |
| Cd        | mg/L  | 3 | 1  | 0.0010 |        |          | 0.0010  | 0.0010  |
| Mn        | mg/L  | 3 | 3  | 0.113  | 0.0600 | 0.101    | 0.230   | 0.0500  |
| Co        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cu        | mg/L  | 3 | 0  |        |        |          |         |         |
| Fe        | mg/L  | 3 | 3  | 1.57   | 1.04   | 1.35     | 3.10    | 0.560   |
| Pb        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 3 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 3 | 3  | 0.0133 | 0.0100 | 0.0058   | 0.0200  | 0.0100  |
| Cd        | mg/L  | 3 | 1  | 0.0010 |        |          | 0.0010  | 0.0010  |
| Mn        | mg/L  | 3 | 3  | 0.0500 | 0.0400 | 0.0265   | 0.0800  | 0.0300  |
| Co        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cu        | mg/L  | 3 | 0  |        |        |          |         |         |
| Fe        | mg/L  | 3 | 3  | 0.520  | 0.560  | 0.106    | 0.600   | 0.400   |
| Pb        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 3 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 3 | 3  | 0.0350 | 0.0400 | 0.0087   | 0.0400  | 0.0250  |
| Cd        | mg/L  | 3 | 0  |        |        |          |         |         |
| Mn        | mg/L  | 3 | 3  | 0.0767 | 0.0800 | 0.0153   | 0.0900  | 0.0600  |
| Co        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cu        | mg/L  | 3 | 0  |        |        |          |         |         |
| Fe        | mg/L  | 3 | 3  | 0.717  | 0.690  | 0.251    | 0.980   | 0.480   |
| Pb        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 3 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 3 | 2  | 0.0200 |        |          | 0.0200  | 0.0200  |
| Cd        | mg/L  | 3 | 1  | 0.0010 |        |          | 0.0010  | 0.0010  |
| Mn        | mg/L  | 3 | 3  | 0.897  | 1.24   | 0.630    | 1.28    | 0.170   |
| Co        | mg/L  | 3 | 2  | 0.0300 |        |          | 0.0300  | 0.0300  |
| Cu        | mg/L  | 3 | 2  | 0.0075 |        |          | 0.0100  | 0.0050  |
| Fe        | mg/L  | 3 | 3  | 1.07   | 0.500  | 1.16     | 2.40    | 0.300   |
| Pb        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 3 | 3  | 0.0367 | 0.0400 | 0.0058   | 0.0400  | 0.0300  |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 3 | 3  | 0.0200 | 0.0200 |          | 0.0200  | 0.0200  |
| Cd        | mg/L  | 3 | 0  |        |        |          |         |         |
| Mn        | mg/L  | 3 | 3  | 0.235  | 0.235  | 0.0050   | 0.240   | 0.230   |
| Co        | mg/L  | 3 | 2  | 0.0500 |        |          | 0.0600  | 0.0400  |
| Cu        | mg/L  | 3 | 3  | 0.0093 | 0.0100 | 0.0012   | 0.0100  | 0.0080  |
| Fe        | mg/L  | 3 | 3  | 0.767  | 0.560  | 0.578    | 1.42    | 0.320   |
| Pb        | mg/L  | 3 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 3 | 3  | 0.0650 | 0.0650 | 0.0050   | 0.0700  | 0.0600  |

Note: N=number of observations, ND=number detected



Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Zn        | mg/L  | 2 | 2  | 0.0250 |        |          | 0.0300  | 0.0200  |
| Cd        | mg/L  | 2 | 1  | 0.0010 |        |          | 0.0010  | 0.0010  |
| Mn        | mg/L  | 2 | 2  | 0.100  |        |          | 0.100   | 0.100   |
| Co        | mg/L  | 2 | 1  | 0.0400 |        |          | 0.0400  | 0.0400  |
| Cu        | mg/L  | 2 | 2  | 0.0075 |        |          | 0.0100  | 0.0050  |
| Fe        | mg/L  | 2 | 2  | 0.260  |        |          | 0.380   | 0.140   |
| Pb        | mg/L  | 2 | 0  |        |        |          |         |         |
| Cr        | mg/L  | 2 | 2  | 0.0450 |        |          | 0.0600  | 0.0300  |

Note: N=number of observations, ND=number detected

## Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|--------|--------|----------|---------|---------|
| Ni        | mg/L  | 18 | 8  | 0.0213 | 0.0200 | 0.0099   | 0.0400  | 0.0100  |
| Be        | mg/L  | 15 | 0  |        |        |          |         |         |
| Mo        | mg/L  | 15 | 7  | 0.0457 | 0.0400 | 0.0223   | 0.0800  | 0.0200  |
| Ca        | mg/L  | 25 | 25 | 363    | 17.7   | 477      | 1700    | 8.10    |
| V         | mg/L  | 16 | 8  | 0.624  | 0.0450 | 1.65     | 4.70    | 0.0300  |
| Al        | mg/L  | 15 | 15 | 0.449  | 0.400  | 0.217    | 0.800   | 0.160   |
| Mg        | mg/L  | 25 | 25 | 5.33   | 3.40   | 4.53     | 17.0    | 1.55    |

Note: N=number of observations, ND=number detected

## Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| Ni        | mg/L  | 3 | 0  |       |        |          |         |         |
| Be        | mg/L  | 3 | 0  |       |        |          |         |         |
| Mo        | mg/L  | 3 | 0  |       |        |          |         |         |
| Ca        | mg/L  | 5 | 5  | 18.5  | 16.7   | 7.81     | 32.0    | 12.0    |
| V         | mg/L  | 3 | 0  |       |        |          |         |         |
| Al        | mg/L  | 3 | 3  | 0.207 | 0.200  | 0.0503   | 0.260   | 0.160   |
| Mg        | mg/L  | 5 | 5  | 3.88  | 3.30   | 1.55     | 6.60    | 2.80    |

Note: N=number of observations, ND=number detected

## Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| Ni        | mg/L  | 3 | 0  |       |        |          |         |         |
| Be        | mg/L  | 3 | 0  |       |        |          |         |         |
| Mo        | mg/L  | 3 | 0  |       |        |          |         |         |
| Ca        | mg/L  | 5 | 5  | 10.3  | 8.50   | 4.16     | 17.7    | 8.10    |
| V         | mg/L  | 3 | 0  |       |        |          |         |         |
| Al        | mg/L  | 3 | 3  | 0.297 | 0.300  | 0.105    | 0.400   | 0.190   |
| Mg        | mg/L  | 5 | 5  | 2.43  | 2.10   | 0.883    | 4.00    | 1.90    |

Note: N=number of observations, ND=number detected

# Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| Ni        | mg/L  | 3 | 0  |       |        |          |         |         |
| Be        | mg/L  | 2 | 0  |       |        |          |         |         |
| Mo        | mg/L  | 2 | 0  |       |        |          |         |         |
| Ca        | mg/L  | 4 | 4  | 13.0  | 13.2   | 1.46     | 14.5    | 11.0    |
| V         | mg/L  | 2 | 0  |       |        |          |         |         |
| Al        | mg/L  | 2 | 2  | 0.470 |        |          | 0.520   | 0.420   |
| Mg        | mg/L  | 4 | 4  | 3.20  | 3.30   | 0.356    | 3.50    | 2.70    |

Note: N=number of observations, ND=number detected

# Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Ni        | mg/L  | 3 | 3  | 0.0167 | 0.0200 | 0.0058   | 0.0200  | 0.0100  |
| Be        | mg/L  | 2 | 0  |        |        |          |         |         |
| Mo        | mg/L  | 2 | 2  | 0.0300 |        |          | 0.0400  | 0.0200  |
| Ca        | mg/L  | 4 | 4  | 530    | 520    | 60.0     | 600     | 480     |
| V         | mg/L  | 2 | 2  | 0.0350 |        |          | 0.0400  | 0.0300  |
| Al        | mg/L  | 2 | 2  | 0.510  |        |          | 0.640   | 0.380   |
| Mg        | mg/L  | 4 | 4  | 13.8   | 14.6   | 3.89     | 17.0    | 8.80    |

Note: N=number of observations, ND=number detected

# Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Ni        | mg/L  | 3 | 3  | 0.0300 | 0.0300 | 0.0100   | 0.0400  | 0.0200  |
| Be        | mg/L  | 3 | 0  |        |        |          |         |         |
| Mo        | mg/L  | 3 | 3  | 0.0667 | 0.0600 | 0.0115   | 0.0800  | 0.0600  |
| Ca        | mg/L  | 5 | 5  | 1154   | 1040   | 340      | 1700    | 850     |
| V         | mg/L  | 4 | 4  | 1.21   | 0.0500 | 2.32     | 4.70    | 0.0500  |
| Al        | mg/L  | 3 | 3  | 0.720  | 0.680  | 0.0693   | 0.800   | 0.680   |
| Mg        | mg/L  | 5 | 5  | 4.02   | 4.70   | 1.45     | 5.20    | 2.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Ni        | mg/L  | 2 | 2  | 0.0150 |        |          | 0.0200  | 0.0100  |
| Be        | mg/L  | 2 | 0  |        |        |          |         |         |
| Mo        | mg/L  | 2 | 2  | 0.0300 |        |          | 0.0400  | 0.0200  |
| Ca        | mg/L  | 2 | 2  | 495    |        |          | 560     | 430     |
| V         | mg/L  | 2 | 2  | 0.0350 |        |          | 0.0400  | 0.0300  |
| Al        | mg/L  | 2 | 2  | 0.550  |        |          | 0.760   | 0.340   |
| Mg        | mg/L  | 2 | 2  | 6.93   |        |          | 12.3    | 1.55    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|-------|--------|----------|---------|---------|
| Ba        | mg/L  | 16 | 16 | 0.115 | 0.0700 | 0.148    | 0.600   | 0.0100  |
| K         | mg/L  | 24 | 24 | 32.0  | 3.30   | 42.1     | 125     | 0.600   |
| St        | mg/L  | 15 | 15 | 1.21  | 0.130  | 1.38     | 3.80    | 0.0400  |
| Na        | mg/L  | 25 | 25 | 30.7  | 9.00   | 31.9     | 105     | 3.00    |
| Hg        | ug/L  | 1  | 0  |       |        |          |         |         |
| As        | ug/L  | 1  | 0  |       |        |          |         |         |
| Se        | ug/L  | 1  | 0  |       |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Ba        | mg/L  | 3 | 3  | 0.0150 | 0.0150 | 0.0050   | 0.0200  | 0.0100  |
| K         | mg/L  | 5 | 5  | 2.54   | 2.40   | 0.879    | 3.90    | 1.50    |
| St        | mg/L  | 3 | 3  | 0.0800 | 0.0600 | 0.0436   | 0.130   | 0.0500  |
| Na        | mg/L  | 5 | 5  | 6.30   | 5.50   | 2.71     | 11.0    | 4.00    |
| Hg        | ug/L  | 1 | 0  |        |        |          |         |         |
| As        | ug/L  | 1 | 0  |        |        |          |         |         |
| Se        | ug/L  | 1 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Ba        | mg/L  | 4 | 4  | 0.163  | 0.0200 | 0.292    | 0.600   | 0.0100  |
| K         | mg/L  | 4 | 4  | 0.913  | 0.750  | 0.431    | 1.55    | 0.600   |
| St        | mg/L  | 3 | 3  | 0.0500 | 0.0400 | 0.0173   | 0.0700  | 0.0400  |
| Na        | mg/L  | 5 | 5  | 4.80   | 4.00   | 2.39     | 9.00    | 3.00    |
| Hg        | ug/L  | 0 | 0  |        |        |          |         |         |
| As        | ug/L  | 0 | 0  |        |        |          |         |         |
| Se        | ug/L  | 0 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| Ba        | mg/L  | 2 | 2  | 0.0200 |        |          | 0.0200  | 0.0200  |
| K         | mg/L  | 4 | 4  | 1.45   | 1.07   | 0.836    | 2.70    | 0.950   |
| St        | mg/L  | 2 | 2  | 0.0550 |        |          | 0.0600  | 0.0500  |
| Na        | mg/L  | 4 | 4  | 5.50   | 5.25   | 0.707    | 6.50    | 5.00    |
| Hg        | ug/L  | 0 | 0  |        |        |          |         |         |
| As        | ug/L  | 0 | 0  |        |        |          |         |         |
| Se        | ug/L  | 0 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| Ba        | mg/L  | 2 | 2  | 0.155 |        |          | 0.160   | 0.150   |
| K         | mg/L  | 4 | 4  | 36.5  | 34.5   | 5.07     | 44.0    | 33.0    |
| St        | mg/L  | 2 | 2  | 2.00  |        |          | 2.10    | 1.91    |
| Na        | mg/L  | 4 | 4  | 83.2  | 85.0   | 20.1     | 105     | 58.0    |
| Hg        | ug/L  | 0 | 0  |       |        |          |         |         |
| As        | ug/L  | 0 | 0  |       |        |          |         |         |
| Se        | ug/L  | 0 | 0  |       |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| Ba        | mg/L  | 3 | 3  | 0.160 | 0.150  | 0.0458   | 0.210   | 0.120   |
| K         | mg/L  | 5 | 5  | 107   | 110    | 15.1     | 125     | 84.0    |
| St        | mg/L  | 3 | 3  | 3.33  | 3.20   | 0.416    | 3.80    | 3.00    |
| Na        | mg/L  | 5 | 5  | 54.0  | 55.0   | 7.48     | 65.0    | 47.0    |
| Hg        | ug/L  | 0 | 0  |       |        |          |         |         |
| As        | ug/L  | 0 | 0  |       |        |          |         |         |
| Se        | ug/L  | 0 | 0  |       |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| Ba        | mg/L  | 2 | 2  | 0.155 |        |          | 0.170   | 0.140   |
| K         | mg/L  | 2 | 2  | 34.0  |        |          | 36.0    | 32.0    |
| St        | mg/L  | 2 | 2  | 1.82  |        |          | 2.00    | 1.63    |
| Na        | mg/L  | 2 | 2  | 43.5  |        |          | 47.0    | 40.0    |
| Hg        | ug/L  | 0 | 0  |       |        |          |         |         |
| As        | ug/L  | 0 | 0  |       |        |          |         |         |
| Se        | ug/L  | 0 | 0  |       |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|-------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 16 | 10 | 95.9  | 20.5   | 164      | 500     | 0.0100  |
| PNACNY    | ug/L  | 16 | 6  | 6.89  | 2.95   | 8.47     | 18.0    | 0.130   |
| PNACNY    | ug/L  | 16 | 8  | 29.0  | 1.15   | 56.1     | 160     | 0.100   |
| PNFLUO    | ug/L  | 16 | 8  | 22.6  | 0.900  | 33.9     | 76.0    | 0.100   |
| PNPHEN    | ug/L  | 16 | 11 | 20.3  | 1.05   | 36.7     | 96.0    | 0.0300  |
| PNANTH    | ug/L  | 16 | 5  | 4.15  | 3.20   | 4.85     | 12.0    | 0.150   |
| PNFLAN    | ug/L  | 16 | 9  | 3.15  | 0.900  | 4.42     | 13.0    | 0.100   |
| PNPYR     | ug/L  | 16 | 9  | 2.00  | 0.600  | 2.97     | 9.10    | 0.100   |
| PNBAA     | ug/L  | 16 | 4  | 0.200 | 0.150  | 0.141    | 0.400   | 0.100   |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 3 | 2  | 0.0600 |        |          | 0.100   | 0.0200  |
| PNACNY    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNACNY    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNFLUO    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNPHEN    | ug/L  | 3 | 1  | 0.0500 |        |          | 0.0500  | 0.0500  |
| PNANTH    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNFLAN    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNPYR     | ug/L  | 3 | 0  |        |        |          |         |         |
| PNBAA     | ug/L  | 3 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 3 | 2  | 0.0200 |        |          | 0.0300  | 0.0100  |
| PNACNY    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNACNY    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNFLUO    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNPHEN    | ug/L  | 3 | 1  | 0.0300 |        |          | 0.0300  | 0.0300  |
| PNANTH    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNFLAN    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNPYR     | ug/L  | 3 | 0  |        |        |          |         |         |
| PNBAA     | ug/L  | 3 | 0  |        |        |          |         |         |

Note: N=number of observations, ND=number detected



Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNACNY    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNACNY    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNFLUO    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNPHEN    | ug/L  | 2 | 1  | 0.200 |        |          | 0.200   | 0.200   |
| PNANTH    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNFLAN    | ug/L  | 2 | 1  | 0.200 |        |          | 0.200   | 0.200   |
| PNPYR     | ug/L  | 2 | 1  | 0.100 |        |          | 0.100   | 0.100   |
| PNBAA     | ug/L  | 2 | 1  | 0.100 |        |          | 0.100   | 0.100   |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 2 | 2  | 289   |        |          | 500     | 78.0    |
| PNACNY    | ug/L  | 2 | 2  | 11.2  |        |          | 17.0    | 5.50    |
| PNACNY    | ug/L  | 2 | 2  | 34.2  |        |          | 54.0    | 14.4    |
| PNFLUO    | ug/L  | 2 | 2  | 51.0  |        |          | 75.0    | 27.0    |
| PNPHEN    | ug/L  | 2 | 2  | 60.5  |        |          | 87.0    | 34.0    |
| PNANTH    | ug/L  | 2 | 2  | 4.15  |        |          | 5.10    | 3.20    |
| PNFLAN    | ug/L  | 2 | 2  | 6.00  |        |          | 7.10    | 4.90    |
| PNPYR     | ug/L  | 2 | 2  | 3.25  |        |          | 4.10    | 2.40    |
| PNBAA     | ug/L  | 2 | 2  | 0.150 |        |          | 0.200   | 0.100   |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 3 | 3  | 104   | 39.0   | 145      | 270     | 2.10    |
| PNACNY    | ug/L  | 3 | 3  | 0.277 | 0.300  | 0.137    | 0.400   | 0.130   |
| PNACNY    | ug/L  | 3 | 3  | 0.903 | 0.900  | 0.495    | 1.40    | 0.410   |
| PNFLUO    | ug/L  | 3 | 3  | 0.790 | 0.800  | 0.215    | 1.00    | 0.570   |
| PNPHEN    | ug/L  | 3 | 3  | 1.72  | 1.60   | 0.732    | 2.50    | 1.05    |
| PNANTH    | ug/L  | 3 | 2  | 0.225 |        |          | 0.300   | 0.150   |
| PNFLAN    | ug/L  | 3 | 3  | 0.717 | 0.700  | 0.176    | 0.900   | 0.550   |
| PNPYR     | ug/L  | 3 | 3  | 0.470 | 0.410  | 0.113    | 0.600   | 0.400   |
| PNBAA     | ug/L  | 3 | 0  |       |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNNAPH    | ug/L  | 1 | 1  | 70.0  |        |          | 70.0    | 70.0    |
| PNACNY    | ug/L  | 1 | 1  | 18.0  |        |          | 18.0    | 18.0    |
| PNACNY    | ug/L  | 1 | 1  | 160   |        |          | 160     | 160     |
| PNFLUO    | ug/L  | 1 | 1  | 76.0  |        |          | 76.0    | 76.0    |
| PNPHEN    | ug/L  | 1 | 1  | 96.0  |        |          | 96.0    | 96.0    |
| PNANTH    | ug/L  | 1 | 1  | 12.0  |        |          | 12.0    | 12.0    |
| PNFLAN    | ug/L  | 1 | 1  | 13.0  |        |          | 13.0    | 13.0    |
| PNPYR     | ug/L  | 1 | 1  | 9.10  |        |          | 9.10    | 9.10    |
| PNBAA     | ug/L  | 1 | 1  | 0.400 |        |          | 0.400   | 0.400   |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N  | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|----|----|-------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 16 | 3  | 0.200 | 0.100  | 0.173    | 0.400   | 0.100   |
| PNBBFA    | ug/L  | 15 | 1  | 0.100 |        |          | 0.100   | 0.100   |
| PNBKF     | ug/L  | 11 | 1  | 0.100 |        |          | 0.100   | 0.100   |
| PNBAP     | ug/L  | 15 | 1  | 0.200 |        |          | 0.200   | 0.200   |
| PNPERY    | ug/L  | 15 | 0  |       |        |          |         |         |
| PNINP     | ug/L  | 15 | 0  |       |        |          |         |         |
| PNDAHA    | ug/L  | 15 | 0  |       |        |          |         |         |
| PNGHIP    | ug/L  | 15 | 0  |       |        |          |         |         |
| TPAH      | ug/L  | 8  | 8  | 155   | 23.3   | 249      | 710     | 0.0100  |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 3 | 0  |       |        |          |         |         |
| PNBBFA    | ug/L  | 3 | 0  |       |        |          |         |         |
| PNBKF     | ug/L  | 2 | 0  |       |        |          |         |         |
| PNBAP     | ug/L  | 3 | 0  |       |        |          |         |         |
| PNPERY    | ug/L  | 3 | 0  |       |        |          |         |         |
| PNINP     | ug/L  | 3 | 0  |       |        |          |         |         |
| PNDAHA    | ug/L  | 3 | 0  |       |        |          |         |         |
| PNGHIP    | ug/L  | 3 | 0  |       |        |          |         |         |
| TPAH      | ug/L  | 2 | 2  | 0.240 |        |          | 0.470   | 0.0100  |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean   | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|--------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNBBFA    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNBKF     | ug/L  | 2 | 0  |        |        |          |         |         |
| PNBAP     | ug/L  | 3 | 0  |        |        |          |         |         |
| PNPERY    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNINP     | ug/L  | 3 | 0  |        |        |          |         |         |
| PNDAHA    | ug/L  | 3 | 0  |        |        |          |         |         |
| PNGHIP    | ug/L  | 3 | 0  |        |        |          |         |         |
| TPAH      | ug/L  | 2 | 2  | 0.0350 |        |          | 0.0600  | 0.0100  |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNBBFA    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNBKF     | ug/L  | 2 | 0  |      |        |          |         |         |
| PNBAP     | ug/L  | 2 | 0  |      |        |          |         |         |
| PNPERY    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNINP     | ug/L  | 2 | 0  |      |        |          |         |         |
| PNDAHA    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNGHIP    | ug/L  | 2 | 0  |      |        |          |         |         |
| TPAH      | ug/L  | 0 | 0  |      |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 2 | 2  | 0.100 |        |          | 0.100   | 0.100   |
| PNBBFA    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNBKF     | ug/L  | 1 | 0  |       |        |          |         |         |
| PNBAP     | ug/L  | 2 | 0  |       |        |          |         |         |
| PNPERY    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNINP     | ug/L  | 2 | 0  |       |        |          |         |         |
| PNDAHA    | ug/L  | 2 | 0  |       |        |          |         |         |
| PNGHIP    | ug/L  | 2 | 0  |       |        |          |         |         |
| TPAH      | ug/L  | 2 | 2  | 460   |        |          | 710     | 209     |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 3 | 0  |      |        |          |         |         |
| PNBBFA    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNBKF     | ug/L  | 1 | 0  |      |        |          |         |         |
| PNBAP     | ug/L  | 2 | 0  |      |        |          |         |         |
| PNPERY    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNINP     | ug/L  | 2 | 0  |      |        |          |         |         |
| PNDAHA    | ug/L  | 2 | 0  |      |        |          |         |         |
| PNGHIP    | ug/L  | 2 | 0  |      |        |          |         |         |
| TPAH      | ug/L  | 2 | 2  | 160  |        |          | 275     | 46.1    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean  | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|-------|--------|----------|---------|---------|
| PNCHRY    | ug/L  | 1 | 1  | 0.400 |        |          | 0.400   | 0.400   |
| PNBBFA    | ug/L  | 1 | 1  | 0.100 |        |          | 0.100   | 0.100   |
| PNBKF     | ug/L  | 1 | 1  | 0.100 |        |          | 0.100   | 0.100   |
| PNBAP     | ug/L  | 1 | 1  | 0.200 |        |          | 0.200   | 0.200   |
| PNPERY    | ug/L  | 1 | 0  |       |        |          |         |         |
| PNINP     | ug/L  | 1 | 0  |       |        |          |         |         |
| PNDAHA    | ug/L  | 1 | 0  |       |        |          |         |         |
| PNGHIP    | ug/L  | 1 | 0  |       |        |          |         |         |
| TPAH      | ug/L  | 0 | 0  |       |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station All outfalls considered

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 5 | 2  | 12.8 |        |          | 22.0    | 3.50    |
| Toluene   | ug/L  | 5 | 1  | 13.0 |        |          | 13.0    | 13.0    |
| Xylenes   | ug/L  | 5 | 2  | 16.5 |        |          | 30.0    | 3.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-1

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Toluene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Xylenes   | ug/L  | 1 | 0  |      |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-2

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Toluene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Xylenes   | ug/L  | 1 | 0  |      |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-3

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Toluene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Xylenes   | ug/L  | 1 | 0  |      |        |          |         |         |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-4

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 1 | 1  | 22.0 |        |          | 22.0    | 22.0    |
| Toluene   | ug/L  | 1 | 1  | 13.0 |        |          | 13.0    | 13.0    |
| Xylenes   | ug/L  | 1 | 1  | 30.0 |        |          | 30.0    | 30.0    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-5

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 1 | 1  | 3.50 |        |          | 3.50    | 3.50    |
| Toluene   | ug/L  | 1 | 0  |      |        |          |         |         |
| Xylenes   | ug/L  | 1 | 1  | 3.00 |        |          | 3.00    | 3.00    |

Note: N=number of observations, ND=number detected

Summary of Water Quality Data for Station Algoma SW-6

| Parameter | Units | N | ND | Mean | Median | Std.Dev. | Maximum | Minimum |
|-----------|-------|---|----|------|--------|----------|---------|---------|
| Benzene   | ug/L  | 0 | 0  |      |        |          |         |         |
| Toluene   | ug/L  | 0 | 0  |      |        |          |         |         |
| Xylenes   | ug/L  | 0 | 0  |      |        |          |         |         |

Note: N=number of observations, ND=number detected



**APPENDIX 13**

**SURFACE WATER LOADING DATA**

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 1: Concentration file: algo2b.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-1

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter<br>Code | N | ND | Units | Raw data statistics |        |       |        | Range  |        | Log(e) Transform Statistics |       |        |       |
|-------------------|---|----|-------|---------------------|--------|-------|--------|--------|--------|-----------------------------|-------|--------|-------|
|                   |   |    |       | Mean                | Std    | Skew  | Kurt   | Min    | Max    | Mean                        | Std   | Skew   | Kurt  |
| Cl                | 6 | 6  | mg/L  | 10.400              | 4.578  | 1.129 | 6.843  | 6.000  | 18.200 | 2.268                       | 0.414 | 0.591  | 5.575 |
| F                 | 6 | 6  | mg/L  | 0.070               | 0.025  | 2.112 | 11.006 | 0.050  | 0.120  | -2.703                      | 0.305 | 1.787  | 9.994 |
| SO4               | 6 | 6  | mg/L  | 28.167              | 13.136 | 1.264 | 7.195  | 16.000 | 51.000 | 3.257                       | 0.430 | 0.730  | 5.831 |
| NH4-N             | 1 | 1  | mg/L  | 0.500               | 0.000  | 0.000 | 0.000  | 0.500  | 0.500  | -0.693                      | 0.000 | 0.000  | 0.000 |
| NO3-N             | 6 | 6  | mg/L  | 0.188               | 0.157  | 1.618 | 9.031  | 0.040  | 0.480  | -1.946                      | 0.832 | -0.088 | 7.117 |
| TkN               | 6 | 6  | mg/L  | 0.486               | 0.144  | 0.554 | 5.667  | 0.320  | 0.710  | -0.758                      | 0.295 | 0.145  | 5.065 |
| TP                | 6 | 6  | mg/L  | 0.009               | 0.004  | 1.328 | 7.695  | 0.006  | 0.015  | -4.811                      | 0.376 | 0.862  | 5.885 |
| DOC               | 7 | 7  | mg/L  | 6.636               | 1.431  | 1.673 | 7.897  | 5.500  | 9.500  | 1.875                       | 0.196 | 1.449  | 6.946 |
| Phnol             | 7 | 1  | mg/L  | 0.006               | 0.000  | 0.000 | 0.000  | 0.006  | 0.006  | -5.116                      | 0.000 | 0.000  | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |        |       | MLE Estimates |       | Regression Estimates |        |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|--------|-------|---------------|-------|----------------------|--------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans | Mean          | TStd  | Trans                | Mean   | TStd  | R**2  |
| Cl             | 6 | 6  | mg/L  | 0.010 | 10.400                       | 10.400   | 10.400 | LN    | 10.500        | 0.171 | LN                   | 10.500 | 0.414 | 0.971 |
| F              | 6 | 6  | mg/L  | 0.010 | 0.070                        | 0.070    | 0.070  | LN    | 0.070         | 0.093 | LN                   | 0.070  | 0.305 | 0.722 |
| SO4            | 6 | 6  | mg/L  | 0.050 | 28.200                       | 28.200   | 28.200 | LN    | 28.500        | 0.185 | LN                   | 28.500 | 0.430 | 0.951 |
| NH4-N          | 1 | 1  | mg/L  | 0.050 | 0.500                        | 0.500    | 0.500  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| NO3-N          | 6 | 6  | mg/L  | 0.010 | 0.190                        | 0.190    | 0.190  | LN    | 0.200         | 0.692 | LN                   | 0.200  | 0.832 | 0.920 |
| TkN            | 6 | 6  | mg/L  | 0.050 | 0.490                        | 0.490    | 0.490  | LN    | 0.490         | 0.087 | LN                   | 0.490  | 0.295 | 0.958 |
| TP             | 6 | 6  | mg/L  | 0.001 | 0.009                        | 0.009    | 0.009  | LN    | 0.009         | 0.141 | LN                   | 0.009  | 0.376 | 0.861 |
| DOC            | 7 | 7  | mg/L  | 0.500 | 6.640                        | 6.640    | 6.640  | LN    | 6.650         | 0.038 | LN                   | 6.650  | 0.196 | 0.812 |
| Phnol          | 7 | 1  | mg/L  | 0.001 | 0.002                        | 0.001    | 0.001  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | Instantaneous Loadings |    |       |       | TStd  | Weighted Ave. with Cu values |          |          | MLE Estimates |          | Regression Estimates |       |          |       |
|----------------|------------------------|----|-------|-------|-------|------------------------------|----------|----------|---------------|----------|----------------------|-------|----------|-------|
|                | N                      | ND | Units | Mean  |       | Cu=DL                        | Cu=0.5DL | Cu=0     | Trans         | Mean     | X                    | Trans | Mean     | X     |
| Cl             | 0                      | 0  | kg/d  | 0.000 | 0.000 | 607.000                      | 607.000  | 607.000  | LN            | 613.000  | 0.581                | LN    | 613.000  | 0.601 |
| F              | 0                      | 0  | kg/d  | 0.000 | 0.000 | 4.090                        | 4.090    | 4.090    | LN            | 4.090    | 0.578                | LN    | 4.090    | 0.590 |
| SO4            | 0                      | 0  | kg/d  | 0.000 | 0.000 | 1650.000                     | 1650.000 | 1650.000 | LN            | 1660.000 | 0.581                | LN    | 1660.000 | 0.602 |
| NH4-N          | 0                      | 0  | kg/d  | 0.000 | 0.000 | 29.200                       | 29.200   | 29.200   | N/A           | 0.000    | 0.000                | N/A   | 0.000    | 0.000 |
| NO3-N          | 0                      | 0  | kg/d  | 0.000 | 0.000 | 11.100                       | 11.100   | 11.100   | LN            | 11.700   | 0.642                | LN    | 11.700   | 0.669 |
| TkN            | 0                      | 0  | kg/d  | 0.000 | 0.000 | 28.600                       | 28.600   | 28.600   | LN            | 28.600   | 0.577                | LN    | 28.600   | 0.589 |
| TP             | 0                      | 0  | g/d   | 0.000 | 0.000 | 508.000                      | 508.000  | 508.000  | LN            | 508.000  | 0.579                | LN    | 508.000  | 0.596 |
| DOC            | 0                      | 0  | kg/d  | 0.000 | 0.000 | 388.000                      | 388.000  | 388.000  | LN            | 388.000  | 0.576                | LN    | 388.000  | 0.581 |
| Phnol          | 0                      | 0  | g/d   | 0.000 | 0.000 | 99.300                       | 75.900   | 50.200   | N/A           | 0.000    | 0.000                | N/A   | 0.000    | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |            |          | Units | Loading Estimates |            |          |
|----------------|-------|-------------------------|------------|----------|-------|-------------------|------------|----------|
|                |       | Mean                    | Confidence | Interval |       | Mean              | Confidence | Interval |
| Cl             | mg/L  | 10.500                  | 9.160      | 12.000   | kg/d  | 613.00            | 196.00     | 1910.00  |
| F              | mg/L  | 0.070                   | 0.065      | 0.075    | kg/d  | 4.09              | 1.32       | 12.70    |
| SO4            | mg/L  | 28.500                  | 24.600     | 33.000   | kg/d  | 1660.00           | 531.00     | 5190.00  |
| NH4-N          | mg/L  | 0.500#                  |            |          | kg/d  | 29.20#            |            |          |
| NO3-N          | mg/L  | 0.200                   | 0.120      | 0.350    | kg/d  | 11.70             | 3.33       | 41.20    |
| TkN            | mg/L  | 0.490                   | 0.460      | 0.530    | kg/d  | 28.60             | 9.22       | 88.70    |
| TP             | mg/L  | 0.009                   | 0.008      | 0.010    | g/d   | 508.00            | 163.00     | 1580.00  |
| DOC            | mg/L  | 6.650                   | 6.460      | 6.840    | kg/d  | 388.00            | 125.00     | 1200.00  |
| Phnol          | mg/L  | 0.001#                  |            |          | g/d   | 75.90#            |            |          |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 2: Concentration file: algo2b.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-2

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

| Parameter Code | Statistical Analysis of Detected Concentrations |    |       |       |                     |        |       |       |        |             |                      |        |        |
|----------------|-------------------------------------------------|----|-------|-------|---------------------|--------|-------|-------|--------|-------------|----------------------|--------|--------|
|                | N                                               | ND | Units | Mean  | Raw data statistics |        |       | Range |        | Log(e) Mean | Transform Statistics |        |        |
|                |                                                 |    |       |       | Std                 | Skew   | Kurt  | Min   | Max    |             | Std                  | Skew   | Kurt   |
| Cl             | 6                                               | 6  | mg/L  | 7.792 | 3.698               | 1.012  | 5.895 | 4.500 | 13.800 | 1.966       | 0.448                | 0.627  | 4.874  |
| F              | 6                                               | 6  | mg/L  | 0.042 | 0.028               | -0.150 | 5.633 | 0.003 | 0.080  | -3.546      | 1.204                | -1.718 | 9.251  |
| SO4            | 6                                               | 6  | mg/L  | 9.058 | 1.896               | -1.000 | 7.928 | 5.750 | 11.200 | 2.183       | 0.234                | -1.468 | 9.110  |
| NH4-N          | 0                                               | 0  | mg/L  | 0.000 | 0.000               | 0.000  | 0.000 | 0.000 | 0.000  | 0.000       | 0.000                | 0.000  | 0.000  |
| NO3-N          | 6                                               | 6  | mg/L  | 0.182 | 0.145               | 1.893  | 9.974 | 0.070 | 0.460  | -1.915      | 0.673                | 0.965  | 7.050  |
| TkN            | 6                                               | 6  | mg/L  | 0.293 | 0.041               | 1.651  | 9.337 | 0.260 | 0.370  | -1.234      | 0.131                | 1.452  | 8.689  |
| TP             | 5                                               | 5  | mg/L  | 0.010 | 0.004               | 0.459  | 9.934 | 0.004 | 0.016  | -4.737      | 0.499                | -0.884 | 10.287 |
| DOC            | 7                                               | 7  | mg/L  | 6.429 | 1.466               | 0.933  | 5.304 | 5.000 | 9.000  | 1.840       | 0.218                | 0.679  | 4.557  |
| Phnol          | 7                                               | 1  | mg/L  | 0.003 | 0.000               | 0.000  | 0.000 | 0.003 | 0.003  | -5.809      | 0.000                | 0.000  | 0.000  |

| Mean Concentration Estimates (CBAR) |   |    |       |       |                              |          |       |       |               |       |                      |       |       |       |
|-------------------------------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
| Parameter Code                      | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|                                     |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| Cl                                  | 6 | 6  | mg/L  | 0.010 | 7.790                        | 7.790    | 7.790 | LN    | 7.900         | 0.201 | LN                   | 7.900 | 0.448 | 0.947 |
| F                                   | 6 | 6  | mg/L  | 0.010 | 0.042                        | 0.042    | 0.042 | LN    | 0.060         | 1.449 | LN                   | 0.060 | 1.204 | 0.784 |
| SO4                                 | 6 | 6  | mg/L  | 0.050 | 9.060                        | 9.060    | 9.060 | LN    | 9.120         | 0.055 | N/A                  | 0.000 | 0.000 | 0.000 |
| NO3-N                               | 6 | 6  | mg/L  | 0.010 | 0.180                        | 0.180    | 0.180 | LN    | 0.180         | 0.453 | LN                   | 0.180 | 0.673 | 0.926 |
| TkN                                 | 6 | 6  | mg/L  | 0.050 | 0.290                        | 0.290    | 0.290 | LN    | 0.290         | 0.017 | N/A                  | 0.000 | 0.000 | 0.000 |
| TP                                  | 5 | 5  | mg/L  | 0.001 | 0.010                        | 0.010    | 0.010 | LN    | 0.010         | 0.249 | LN                   | 0.010 | 0.499 | 0.831 |
| DOC                                 | 7 | 7  | mg/L  | 0.500 | 6.430                        | 6.430    | 6.430 | LN    | 6.450         | 0.047 | LN                   | 6.450 | 0.218 | 0.941 |
| Phnol                               | 7 | 1  | mg/L  | 0.001 | 0.001                        | 0.001    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

| Loading Estimates: Load=QBAR*CBAR |   |    |       |       |                              |         |          |         |               |         |                      |       |         |       |
|-----------------------------------|---|----|-------|-------|------------------------------|---------|----------|---------|---------------|---------|----------------------|-------|---------|-------|
| Parameter Code                    | N | ND | Units | Mean  | Weighted Ave. with Cu values |         |          |         | MLE Estimates |         | Regression Estimates |       |         |       |
|                                   |   |    |       |       | TStd                         | Cu=DL   | Cu=0.5DL | Cu=0    | Trans         | Mean    | X                    | Trans | Mean    | X     |
| Cl                                | 0 | 0  | kg/d  | 0.000 | 0.000                        | 455.000 | 455.000  | 455.000 | LN            | 461.000 | 0.582                | LN    | 461.000 | 0.605 |
| F                                 | 0 | 0  | kg/d  | 0.000 | 0.000                        | 2.450   | 2.450    | 2.450   | LN            | 3.500   | 0.826                | LN    | 3.500   | 0.757 |
| SO4                               | 0 | 0  | kg/d  | 0.000 | 0.000                        | 529.000 | 529.000  | 529.000 | LN            | 533.000 | 0.577                | N/A   | 0.000   | 0.000 |
| NO3-N                             | 0 | 0  | kg/d  | 0.000 | 0.000                        | 10.500  | 10.500   | 10.500  | LN            | 10.500  | 0.605                | LN    | 10.500  | 0.638 |
| TkN                               | 0 | 0  | kg/d  | 0.000 | 0.000                        | 16.900  | 16.900   | 16.900  | LN            | 16.900  | 0.576                | N/A   | 0.000   | 0.000 |
| TP                                | 0 | 0  | g/d   | 0.000 | 0.000                        | 561.000 | 561.000  | 561.000 | LN            | 578.000 | 0.587                | LN    | 578.000 | 0.618 |
| DOC                               | 0 | 0  | kg/d  | 0.000 | 0.000                        | 376.000 | 376.000  | 376.000 | LN            | 377.000 | 0.577                | LN    | 377.000 | 0.582 |
| Phnol                             | 0 | 0  | g/d   | 0.000 | 0.000                        | 75.900  | 50.200   | 25.100  | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |

| Summary of Mean Concentration and Total Loading Estimates |       |                         |            |          |       |                   |            |          |          |
|-----------------------------------------------------------|-------|-------------------------|------------|----------|-------|-------------------|------------|----------|----------|
| Parameter Code                                            | Units | Concentration Estimates |            |          | Units | Loading Estimates |            |          | Interval |
|                                                           |       | Mean                    | Confidence | Interval |       | Mean              | Confidence | Interval |          |
| Cl                                                        | mg/L  | 7.900                   | 6.730      | 9.280    | kg/d  | 461.00            | 147.00     | 1440.00  |          |
| F                                                         | mg/L  | 0.060                   | 0.019      | 0.190    | kg/d  | 3.50              | 0.69       | 17.70    |          |
| SO4                                                       | mg/L  | 9.120                   | 8.730      | 9.530    | kg/d  | 533.00            | 172.00     | 1650.00  |          |
| NH4-N                                                     | mg/L  | NC                      |            |          | mg/d  | NC                |            |          |          |
| NO3-N                                                     | mg/L  | 0.180                   | 0.130      | 0.260    | kg/d  | 10.50             | 3.21       | 34.40    |          |
| TkN                                                       | mg/L  | 0.290                   | 0.290      | 0.290    | kg/d  | 16.90             | 5.46       | 52.30    |          |
| TP                                                        | mg/L  | 0.010                   | 0.008      | 0.012    | g/d   | 578.00            | 183.00     | 1830.00  |          |
| DOC                                                       | mg/L  | 6.450                   | 6.230      | 6.680    | kg/d  | 377.00            | 122.00     | 1170.00  |          |
| Phnol                                                     | mg/L  | 0.001#                  |            |          | g/d   | 50.20#            |            |          |          |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 3: Concentration file: algo2b.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-3

Number: 1

Mean flow (QBAR): 26300000. L/d Std: 20400000. Skew: 1.32 Kurt: 4.71 Flow points: 12 (LogStd or TStd: 0.795)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |        |        | Range  |        | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|---------------------|-------|--------|--------|--------|--------|-----------------------------|-------|--------|--------|
|                |   |    |       | Mean                | Std   | Skew   | Kurt   | Min    | Max    | Mean                        | Std   | Skew   | Kurt   |
| Cl             | 5 | 5  | mg/L  | 14.080              | 3.652 | 0.987  | 9.419  | 10.100 | 19.800 | 2.619                       | 0.251 | 0.486  | 8.637  |
| F              | 5 | 5  | mg/L  | 0.065               | 0.017 | -0.782 | 6.979  | 0.040  | 0.080  | -2.766                      | 0.296 | -1.068 | 8.029  |
| SO4            | 5 | 5  | mg/L  | 12.330              | 1.627 | -0.817 | 6.723  | 10.000 | 13.800 | 2.505                       | 0.137 | -0.925 | 7.126  |
| NH4-N          | 0 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| NO3-N          | 5 | 5  | mg/L  | 0.314               | 0.183 | -0.480 | 8.787  | 0.045  | 0.540  | -1.421                      | 0.977 | -1.818 | 11.644 |
| TkN            | 4 | 4  | mg/L  | 0.270               | 0.037 | -0.764 | 15.000 | 0.220  | 0.310  | -1.317                      | 0.144 | -1.005 | 15.297 |
| TP             | 4 | 4  | mg/L  | 0.013               | 0.010 | 1.277  | 14.545 | 0.004  | 0.027  | -4.648                      | 0.846 | 0.409  | 11.640 |
| DOC            | 6 | 6  | mg/L  | 5.017               | 1.123 | 1.261  | 7.640  | 4.000  | 7.000  | 1.594                       | 0.210 | 0.949  | 6.655  |
| Phnol          | 6 | 4  | mg/L  | 0.002               | 0.002 | 0.370  | 9.599  | 0.001  | 0.004  | -6.287                      | 0.727 | 0.134  | 8.268  |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |        |       | MLE Estimates |       | Regression Estimates |        |       |
|----------------|---|----|-------|-------|------------------------------|----------|--------|-------|---------------|-------|----------------------|--------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans | Mean          | TStd  | Trans                | Mean   | TStd  |
| Cl             | 5 | 5  | mg/L  | 0.010 | 14.100                       | 14.100   | 14.100 | LN    | 14.200        | 0.063 | LN                   | 14.200 | 0.251 |
| F              | 5 | 5  | mg/L  | 0.010 | 0.065                        | 0.065    | 0.065  | LN    | 0.066         | 0.088 | LN                   | 0.066  | 0.296 |
| SO4            | 5 | 5  | mg/L  | 0.050 | 12.300                       | 12.300   | 12.300 | LN    | 12.400        | 0.019 | LN                   | 12.400 | 0.137 |
| NO3-N          | 5 | 5  | mg/L  | 0.010 | 0.310                        | 0.310    | 0.310  | LN    | 0.390         | 0.954 | LN                   | 0.390  | 0.977 |
| TkN            | 4 | 4  | mg/L  | 0.050 | 0.270                        | 0.270    | 0.270  | LN    | 0.270         | 0.021 | LN                   | 0.270  | 0.144 |
| TP             | 4 | 4  | mg/L  | 0.001 | 0.012                        | 0.012    | 0.012  | LN    | 0.014         | 0.716 | LN                   | 0.014  | 0.846 |
| DOC            | 6 | 6  | mg/L  | 0.500 | 5.020                        | 5.020    | 5.020  | LN    | 5.030         | 0.044 | LN                   | 5.030  | 0.210 |
| Phnol          | 6 | 4  | mg/L  | 0.001 | 0.002                        | 0.002    | 0.002  | LN    | 0.002         | 0.790 | LN                   | 0.002  | 1.004 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Mean  | TStd  | Weighted Ave. with Cu values |          |         |       | MLE Estimates |       | Regression Estimates |         |       |
|----------------|---|----|-------|-------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|---------|-------|
|                |   |    |       |       |       | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans | Mean          | X     | Trans                | Mean    | X     |
| Cl             | 0 | 0  | kg/d  | 0.000 | 0.000 | 371.000                      | 371.000  | 371.000 | LN    | 373.000       | 0.231 | LN                   | 373.000 | 0.255 |
| F              | 0 | 0  | kg/d  | 0.000 | 0.000 | 1.710                        | 1.710    | 1.710   | LN    | 1.740         | 0.233 | LN                   | 1.740   | 0.265 |
| SO4            | 0 | 0  | kg/d  | 0.000 | 0.000 | 323.000                      | 323.000  | 323.000 | LN    | 326.000       | 0.230 | LN                   | 326.000 | 0.237 |
| NO3-N          | 0 | 0  | kg/d  | 0.000 | 0.000 | 8.150                        | 8.150    | 8.150   | LN    | 10.300        | 0.484 | LN                   | 10.300  | 0.493 |
| TkN            | 0 | 0  | kg/d  | 0.000 | 0.000 | 7.100                        | 7.100    | 7.100   | LN    | 7.100         | 0.230 | LN                   | 7.100   | 0.240 |
| TP             | 0 | 0  | g/d   | 0.000 | 0.000 | 316.000                      | 316.000  | 316.000 | LN    | 368.000       | 0.425 | LN                   | 368.000 | 0.481 |
| DOC            | 0 | 0  | kg/d  | 0.000 | 0.000 | 132.000                      | 132.000  | 132.000 | LN    | 132.000       | 0.230 | LN                   | 132.000 | 0.245 |
| Phnol          | 0 | 0  | g/d   | 0.000 | 0.000 | 47.300                       | 44.700   | 39.500  | LN    | 47.300        | 0.396 | LN                   | 47.300  | 0.470 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |  | Units | Loading Estimates |                     |  |
|----------------|-------|-------------------------|---------------------|--|-------|-------------------|---------------------|--|
|                |       | Mean                    | Confidence Interval |  |       | Mean              | Confidence Interval |  |
| Cl             | mg/L  | 14.200                  | 13.400 15.000       |  | kg/d  | 373.00            | 237.00 587.00       |  |
| F              | mg/L  | 0.066                   | 0.061 0.071         |  | kg/d  | 1.74              | 1.10 2.75           |  |
| SO4            | mg/L  | 12.400                  | 12.200 12.600       |  | kg/d  | 326.00            | 208.00 511.00       |  |
| NH4-N          | mg/L  | NC                      |                     |  | mg/d  | NC                |                     |  |
| NO3-N          | mg/L  | 0.390                   | 0.170 0.900         |  | kg/d  | 10.30             | 3.99 26.60          |  |
| TkN            | mg/L  | 0.270                   | 0.260 0.280         |  | kg/d  | 7.10              | 4.53 11.10          |  |
| TP             | mg/L  | 0.014                   | 0.007 0.028         |  | g/d   | 368.00            | 160.00 847.00       |  |
| DOC            | mg/L  | 5.030                   | 4.860 5.210         |  | kg/d  | 132.00            | 84.10 207.00        |  |
| Phnol          | mg/L  | 0.002                   | 0.001 0.003         |  | g/d   | 47.30             | 21.80 103.00        |  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 4: Concentration file: algo2b.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-4

Number: 1

Mean flow (QBAR): 88600. L/d Std: 105000. Skew: 1.42 Kurt: 6.51 Flow points: 8 (LogStd or TStd: 1.730)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |         |        |        | Range   |          | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|---------------------|---------|--------|--------|---------|----------|-----------------------------|-------|--------|--------|
|                |   |    |       | Mean                | Std     | Skew   | Kurt   | Min     | Max      | Mean                        | Std   | Skew   | Kurt   |
| Cl             | 6 | 6  | mg/L  | 1092.500            | 436.437 | -1.708 | 9.374  | 270.000 | 1460.000 | 6.872                       | 0.639 | -2.203 | 11.271 |
| F              | 6 | 5  | mg/L  | 1.010               | 0.160   | 0.467  | 10.116 | 0.800   | 1.250    | 0.000                       | 0.158 | 0.000  | 10.000 |
| SO4            | 6 | 6  | mg/L  | 216.333             | 44.428  | -0.032 | 4.362  | 166.000 | 270.000  | 5.359                       | 0.210 | -0.219 | 4.334  |
| NH4-N          | 0 | 0  | mg/L  | 0.000               | 0.000   | 0.000  | 0.000  | 0.000   | 0.000    | 0.000                       | 0.000 | 0.000  | 0.000  |
| NO3-N          | 6 | 3  | mg/L  | 0.183               | 0.076   | -0.935 | 0.000  | 0.100   | 0.250    | -1.766                      | 0.478 | -1.317 | 0.000  |
| TkN            | 5 | 5  | mg/L  | 2.202               | 0.728   | 2.204  | 12.886 | 1.800   | 3.500    | 0.754                       | 0.280 | 2.173  | 12.781 |
| TP             | 5 | 5  | mg/L  | 0.023               | 0.037   | 2.170  | 12.753 | 0.002   | 0.088    | -4.680                      | 1.423 | 1.084  | 9.557  |
| DOC            | 7 | 7  | mg/L  | 6.229               | 0.591   | 2.162  | 10.218 | 5.800   | 7.500    | 1.826                       | 0.089 | 2.080  | 9.856  |
| Phnol          | 7 | 7  | mg/L  | 0.256               | 0.247   | 1.124  | 6.667  | 0.034   | 0.720    | -1.909                      | 1.239 | -0.191 | 3.309  |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |          |       | MLE Estimates |       | Regression Estimates |          |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|----------|-------|---------------|-------|----------------------|----------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0     | Trans | Mean          | TStd  | Trans                | Mean     | TStd  | R**2  |
| Cl             | 6 | 6  | mg/L  | 0.010 | 1090.000                     | 1090.000 | 1090.000 | LN    | 1180.000      | 0.409 | LN                   | 1180.000 | 0.639 | 0.639 |
| F              | 6 | 5  | mg/L  | 0.010 | 0.840                        | 0.840    | 0.840    | N/A   | 0.000         | 0.000 | LN                   | 0.970    | 0.179 | 0.800 |
| SO4            | 6 | 6  | mg/L  | 0.050 | 216.000                      | 216.000  | 216.000  | LN    | 217.000       | 0.044 | LN                   | 217.000  | 0.210 | 0.950 |
| NO3-N          | 6 | 3  | mg/L  | 0.010 | 0.097                        | 0.094    | 0.092    | N/A   | 0.000         | 0.000 | N/A                  | 0.000    | 0.000 | 0.000 |
| TkN            | 5 | 5  | mg/L  | 0.050 | 2.200                        | 2.200    | 2.200    | LN    | 2.210         | 0.079 | LN                   | 2.210    | 0.280 | 0.599 |
| TP             | 5 | 5  | mg/L  | 0.001 | 0.023                        | 0.023    | 0.023    | LN    | 0.026         | 2.025 | LN                   | 0.026    | 1.423 | 0.897 |
| DOC            | 7 | 7  | mg/L  | 0.500 | 6.230                        | 6.230    | 6.230    | LN    | 6.230         | 0.008 | LN                   | 6.230    | 0.089 | 0.657 |
| Phnol          | 7 | 7  | mg/L  | 0.001 | 0.260                        | 0.260    | 0.260    | LN    | 0.320         | 1.535 | LN                   | 0.320    | 1.239 | 0.920 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       | Weighted Ave. with Cu values |          |         |       | MLE Estimates |       | Regression Estimates |         |       |
|----------------|---|----|-------|------------------------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|---------|-------|
|                |   |    |       | Mean                   | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans | Mean          | X     | Trans                | Mean    | X     |
| Cl             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 96.600                       | 96.600   | 96.600  | LN    | 105.000       | 0.634 | LN                   | 105.000 | 0.665 |
| F              | 0 | 0  | g/d   | 0.000                  | 0.000 | 74.400                       | 74.400   | 74.400  | N/A   | 0.000         | 0.000 | LN                   | 85.900  | 0.616 |
| SO4            | 0 | 0  | kg/d  | 0.000                  | 0.000 | 19.100                       | 19.100   | 19.100  | LN    | 19.200        | 0.612 | LN                   | 19.200  | 0.618 |
| NO3-N          | 0 | 0  | g/d   | 0.000                  | 0.000 | 8.590                        | 8.330    | 8.150   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |
| TkN            | 0 | 0  | g/d   | 0.000                  | 0.000 | 195.000                      | 195.000  | 195.000 | LN    | 196.000       | 0.613 | LN                   | 196.000 | 0.624 |
| TP             | 0 | 0  | g/d   | 0.000                  | 0.000 | 2.040                        | 2.040    | 2.040   | LN    | 2.300         | 1.093 | LN                   | 2.300   | 0.883 |
| DOC            | 0 | 0  | g/d   | 0.000                  | 0.000 | 552.000                      | 552.000  | 552.000 | LN    | 552.000       | 0.612 | LN                   | 552.000 | 0.613 |
| Phnol          | 0 | 0  | g/d   | 0.000                  | 0.000 | 23.000                       | 23.000   | 23.000  | LN    | 28.400        | 0.843 | LN                   | 28.400  | 0.770 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |            |          | Units | Loading Estimates |            |          |
|----------------|-------|-------------------------|------------|----------|-------|-------------------|------------|----------|
|                |       | Mean                    | Confidence | Interval |       | Mean              | Confidence | Interval |
| Cl             | mg/L  | 1180.000                | 851.000    | 1640.000 | kg/d  | 105.00            | 30.30      | 364.00   |
| F              | mg/L  | 0.970*                  | 0.840      | 1.120    | g/d   | 85.90*            | 25.70      | 287.00   |
| SO4            | mg/L  | 217.000                 | 209.000    | 225.000  | kg/d  | 19.20             | 5.79       | 63.70    |
| NH4-N          | mg/L  | NC                      |            |          | mg/d  | NC                |            |          |
| NO3-N          | mg/L  | 0.094#                  |            |          | g/d   | 8.33#             |            |          |
| TkN            | mg/L  | 2.210                   | 2.060      | 2.370    | g/d   | 196.00            | 59.00      | 651.00   |
| TP             | mg/L  | 0.026                   | 0.004      | 0.150    | g/d   | 2.30              | 0.27       | 19.60    |
| DOC            | mg/L  | 6.230                   | 6.190      | 6.270    | g/d   | 552.00            | 166.00     | 1830.00  |
| Phnol          | mg/L  | 0.320                   | 0.100      | 1.000    | g/d   | 28.40             | 5.44       | 148.00   |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 5: Concentration file: algo2b.dat  
 Analysis for outfall(s): Algoma SW-5  
 Mean flow (QBAR): 339000. L/d Std: 144000. Skew: -1.33

Discharge file: algo.flo  
 Number: 1  
 Kurt: 10.23 Flow points: 5 (LogStd or TStd: 0.614)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |          |        |       | Range    |          | Log(e) Transform Statistics |       |        |       |
|----------------|---|----|-------|---------------------|----------|--------|-------|----------|----------|-----------------------------|-------|--------|-------|
|                |   |    |       | Mean                | Std      | Skew   | Kurt  | Min      | Max      | Mean                        | Std   | Skew   | Kurt  |
| Cl             | 6 | 6  | mg/L  | 2028.333            | 1103.312 | 1.727  | 9.150 | 1210.000 | 4100.000 | 7.515                       | 0.467 | 1.167  | 7.101 |
| F              | 6 | 3  | mg/L  | 1.033               | 0.058    | 1.732  | 0.000 | 1.000    | 1.100    | 0.032                       | 0.055 | 1.732  | 0.000 |
| SO4            | 6 | 6  | mg/L  | 565.000             | 55.767   | -0.327 | 6.289 | 480.000  | 640.000  | 6.333                       | 0.100 | -0.531 | 6.477 |
| NH4-N          | 0 | 0  | mg/L  | 0.000               | 0.000    | 0.000  | 0.000 | 0.000    | 0.000    | 0.000                       | 0.000 | 0.000  | 0.000 |
| NO3-N          | 6 | 3  | mg/L  | 0.350               | 0.218    | 1.630  | 0.000 | 0.200    | 0.600    | -1.169                      | 0.581 | 1.449  | 0.000 |
| TkN            | 6 | 6  | mg/L  | 3.658               | 1.313    | 0.648  | 6.628 | 2.200    | 5.800    | 1.243                       | 0.361 | 0.003  | 5.448 |
| TP             | 5 | 5  | mg/L  | 0.006               | 0.004    | -0.269 | 5.658 | 0.001    | 0.011    | -5.359                      | 1.006 | -1.107 | 8.134 |
| DOC            | 7 | 7  | mg/L  | 11.257              | 3.307    | 0.815  | 5.590 | 7.500    | 17.000   | 2.386                       | 0.285 | 0.324  | 4.887 |
| Phnol          | 7 | 7  | mg/L  | 0.031               | 0.016    | 0.347  | 3.298 | 0.013    | 0.052    | -3.611                      | 0.567 | -0.029 | 3.452 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |          |       | MLE Estimates |       | Regression Estimates |          |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|----------|-------|---------------|-------|----------------------|----------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0     | Trans | Mean          | TStd  | Trans                | Mean     | TStd  | R**2  |
| Cl             | 6 | 6  | mg/L  | 0.010 | 2030.000                     | 2030.000 | 2030.000 | LN    | 2050.000      | 0.218 | LN                   | 2050.000 | 0.467 | 0.867 |
| F              | 6 | 3  | mg/L  | 0.010 | 0.520                        | 0.520    | 0.520    | N/A   | 0.000         | 0.000 | LN                   | 0.970    | 0.091 | 0.750 |
| SO4            | 6 | 6  | mg/L  | 0.050 | 565.000                      | 565.000  | 565.000  | LN    | 566.000       | 0.010 | LN                   | 566.000  | 0.100 | 0.964 |
| NO3-N          | 6 | 3  | mg/L  | 0.010 | 0.180                        | 0.180    | 0.180    | N/A   | 0.000         | 0.000 | LN                   | 0.230    | 1.035 | 0.895 |
| TkN            | 6 | 6  | mg/L  | 0.050 | 3.660                        | 3.660    | 3.660    | LN    | 3.700         | 0.131 | LN                   | 3.700    | 0.361 | 0.952 |
| TP             | 5 | 5  | mg/L  | 0.001 | 0.006                        | 0.006    | 0.006    | LN    | 0.008         | 1.012 | N/A                  | 0.000    | 0.000 | 0.000 |
| DOC            | 7 | 7  | mg/L  | 0.500 | 11.300                       | 11.300   | 11.300   | LN    | 11.300        | 0.081 | LN                   | 11.300   | 0.285 | 0.962 |
| Phnol          | 7 | 7  | mg/L  | 0.001 | 0.031                        | 0.031    | 0.031    | LN    | 0.032         | 0.322 | N/A                  | 0.000    | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | Instantaneous Loadings |    |       |       |       | Weighted Ave. with Cu values |          |         | MLE Estimates |         | Regression Estimates |       |         |       |
|----------------|------------------------|----|-------|-------|-------|------------------------------|----------|---------|---------------|---------|----------------------|-------|---------|-------|
|                | N                      | ND | Units | Mean  | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans         | Mean    | X                    | Trans | Mean    | X     |
| Cl             | 0                      | 0  | kg/d  | 0.000 | 0.000 | 688.000                      | 688.000  | 688.000 | LN            | 695.000 | 0.289                | LN    | 695.000 | 0.334 |
| F              | 0                      | 0  | g/d   | 0.000 | 0.000 | 176.000                      | 176.000  | 176.000 | N/A           | 0.000   | 0.000                | LN    | 329.000 | 0.277 |
| SO4            | 0                      | 0  | kg/d  | 0.000 | 0.000 | 192.000                      | 192.000  | 192.000 | LN            | 192.000 | 0.275                | LN    | 192.000 | 0.278 |
| NO3-N          | 0                      | 0  | g/d   | 0.000 | 0.000 | 61.000                       | 61.000   | 61.000  | N/A           | 0.000   | 0.000                | LN    | 78.000  | 0.504 |
| TkN            | 0                      | 0  | kg/d  | 0.000 | 0.000 | 1.240                        | 1.240    | 1.240   | LN            | 1.250   | 0.280                | LN    | 1.250   | 0.312 |
| TP             | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.170                        | 2.170    | 2.170   | LN            | 2.640   | 0.529                | N/A   | 0.000   | 0.000 |
| DOC            | 0                      | 0  | kg/d  | 0.000 | 0.000 | 3.830                        | 3.830    | 3.830   | LN            | 3.830   | 0.276                | LN    | 3.830   | 0.295 |
| Phnol          | 0                      | 0  | g/d   | 0.000 | 0.000 | 10.500                       | 10.500   | 10.500  | LN            | 10.800  | 0.300                | N/A   | 0.000   | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |  | Units | Loading Estimates |                     |  |
|----------------|-------|-------------------------|---------------------|--|-------|-------------------|---------------------|--|
|                |       | Mean                    | Confidence Interval |  |       | Mean              | Confidence Interval |  |
| Cl             | mg/L  | 2050.000                | 1720.000 2440.000   |  | kg/d  | 695.00            | 395.00 1220.00      |  |
| F              | mg/L  | 0.970*                  | 0.900 1.040         |  | g/d   | 329.00*           | 191.00 566.00       |  |
| SO4            | mg/L  | 566.000                 | 561.000 571.000     |  | kg/d  | 192.00            | 112.00 329.00       |  |
| NH4-N          | mg/L  | NC                      |                     |  | mg/d  | NC                |                     |  |
| NO3-N          | mg/L  | 0.230*                  | 0.100 0.530         |  | g/d   | 78.00*            | 29.10 209.00        |  |
| TkN            | mg/L  | 3.700                   | 3.330 4.110         |  | kg/d  | 1.25              | 0.72 2.16           |  |
| TP             | mg/L  | 0.008                   | 0.003 0.019         |  | g/d   | 2.64              | 0.94 7.45           |  |
| DOC            | mg/L  | 11.300                  | 10.600 12.000       |  | kg/d  | 3.83              | 2.23 6.58           |  |
| Phnol          | mg/L  | 0.032                   | 0.025 0.041         |  | g/d   | 10.80             | 5.99 19.50          |  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 1: Concentration file: algo3.dat  
 Analysis for outfall(s): Algoma SW-1  
 Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

Discharge file: algo.flo

Number: 1

| Parameter Code | N | ND | Units | Statistical Analysis of Detected Concentrations |       |       |       | Range |       | Log(e) Transform Statistics |       |       |       |
|----------------|---|----|-------|-------------------------------------------------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|
|                |   |    |       | Mean                                            | Std   | Skew  | Kurt  | Min   | Max   | Mean                        | Std   | Skew  | Kurt  |
| Zn             | 3 | 1  | mg/L  | 0.020                                           | 0.000 | 0.000 | 0.000 | 0.020 | 0.020 | -3.912                      | 0.000 | 0.000 | 0.000 |
| Cd             | 3 | 1  | mg/L  | 0.001                                           | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | -6.908                      | 0.000 | 0.000 | 0.000 |
| Mn             | 3 | 3  | mg/L  | 0.113                                           | 0.101 | 1.713 | 0.000 | 0.050 | 0.230 | -2.426                      | 0.833 | 1.639 | 0.000 |
| Co             | 3 | 0  | mg/L  | 0.000                                           | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| Cu             | 3 | 0  | mg/L  | 0.000                                           | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| Fe             | 3 | 3  | mg/L  | 1.567                                           | 1.349 | 1.489 | 0.000 | 0.560 | 3.100 | 0.197                       | 0.866 | 0.792 | 0.000 |
| Pb             | 3 | 0  | mg/L  | 0.000                                           | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| Cr             | 3 | 0  | mg/L  | 0.000                                           | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |

| Parameter Code | N | ND | Units | Mean Concentration Estimates (CBAR) |                              |          |       |               |       |                      |       |       |       |
|----------------|---|----|-------|-------------------------------------|------------------------------|----------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       | DL                                  | Weighted Ave. with Cu values |          |       | MLE Estimates |       | Regression Estimates |       |       |       |
| Zn             | 3 | 1  | mg/L  | 0.010                               | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans         | Mean  | TStd                 | Trans | Mean  | TStd  |
| Cd             | 3 | 1  | mg/L  | 0.005                               | 0.013                        | 0.010    | 0.007 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Mn             | 3 | 3  | mg/L  | 0.010                               | 0.004                        | 0.002    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Co             | 3 | 0  | mg/L  | 0.010                               | 0.110                        | 0.110    | 0.110 | LN            | 0.130 | 0.695                | LN    | 0.130 | 0.833 |
| Cu             | 3 | 0  | mg/L  | 0.005                               | 0.010                        | 0.005    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Fe             | 3 | 3  | mg/L  | 0.020                               | 0.005                        | 0.002    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Pb             | 3 | 0  | mg/L  | 0.050                               | 1.570                        | 1.570    | 1.570 | LN            | 1.770 | 0.751                | LN    | 1.770 | 0.866 |
| Cr             | 3 | 0  | mg/L  | 0.010                               | 0.050                        | 0.025    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
|                |   |    |       |                                     | 0.010                        | 0.005    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |

| Parameter Code | N | ND | Units | Loading Estimates: Load=QBAR*CBAR |                              |       |         |               |         |                      |         |       |       |
|----------------|---|----|-------|-----------------------------------|------------------------------|-------|---------|---------------|---------|----------------------|---------|-------|-------|
|                |   |    |       | Instantaneous Loadings            | Weighted Ave. with Cu values |       |         | MLE Estimates |         | Regression Estimates |         |       |       |
| Zn             | 0 | 0  | g/d   | 0.000                             | Mean                         | TStd  | Cu=DL   | Cu=0.5DL      | Cu=0    | Trans                | Mean    | X     | Trans |
| Cd             | 0 | 0  | g/d   | 0.000                             | 0.000                        | 0.000 | 759.000 | 584.000       | 391.000 | N/A                  | 0.000   | 0.000 | N/A   |
| Mn             | 0 | 0  | kg/d  | 0.000                             | 0.000                        | 0.000 | 6.420   | 6.420         | 6.420   | LN                   | 7.590   | 0.702 | LN    |
| Co             | 0 | 0  | g/d   | 0.000                             | 0.000                        | 0.000 | 584.000 | 292.000       | 0.000   | N/A                  | 0.000   | 0.000 | N/A   |
| Cu             | 0 | 0  | g/d   | 0.000                             | 0.000                        | 0.000 | 292.000 | 146.000       | 0.000   | N/A                  | 0.000   | 0.000 | N/A   |
| Fe             | 0 | 0  | kg/d  | 0.000                             | 0.000                        | 0.000 | 91.700  | 91.700        | 91.700  | LN                   | 103.000 | 0.721 | LN    |
| Pb             | 0 | 0  | kg/d  | 0.000                             | 0.000                        | 0.000 | 2.920   | 1.460         | 0.000   | N/A                  | 0.000   | 0.000 | N/A   |
| Cr             | 0 | 0  | g/d   | 0.000                             | 0.000                        | 0.000 | 584.000 | 292.000       | 0.000   | N/A                  | 0.000   | 0.000 | N/A   |

| Parameter Code | Units | Summary of Mean Concentration and Total Loading Estimates |                     |       |                   |         |                     |        |
|----------------|-------|-----------------------------------------------------------|---------------------|-------|-------------------|---------|---------------------|--------|
|                |       | Concentration Estimates                                   |                     |       | Loading Estimates |         |                     |        |
|                |       | Mean                                                      | Confidence Interval |       | Units             | Mean    | Confidence Interval |        |
| Zn             | mg/L  | 0.010#                                                    |                     |       | g/d               | 584.00# |                     |        |
| Cd             | mg/L  | 0.002#                                                    |                     |       | g/d               | 117.00# |                     |        |
| Mn             | mg/L  | 0.130                                                     | 0.059               | 0.290 | kg/d              | 7.59    | 1.92                | 30.10  |
| Co             | mg/L  | NC                                                        |                     |       | g/d               | NC      |                     |        |
| Cu             | mg/L  | NC                                                        |                     |       | g/d               | NC      |                     |        |
| Fe             | mg/L  | 1.770                                                     | 0.760               | 4.140 | kg/d              | 103.00  | 25.10               | 423.00 |
| Pb             | mg/L  | NC                                                        |                     |       | kg/d              | NC      |                     |        |
| Cr             | mg/L  | NC                                                        |                     |       | g/d               | NC      |                     |        |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL



## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 2: Concentration file: algo3.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-2

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |        |       | Range |       | Log(e) Transform Statistics |       |        |       |
|----------------|---|----|-------|---------------------|-------|--------|-------|-------|-------|-----------------------------|-------|--------|-------|
|                |   |    |       | Mean                | Std   | Skew   | Kurt  | Min   | Max   | Mean                        | Std   | Skew   | Kurt  |
| Zn             | 3 | 3  | mg/L  | 0.013               | 0.006 | 1.732  | 0.000 | 0.010 | 0.020 | -4.374                      | 0.400 | 1.732  | 0.000 |
| Cd             | 3 | 1  | mg/L  | 0.001               | 0.000 | 0.000  | 0.000 | 0.001 | 0.001 | -6.908                      | 0.000 | 0.000  | 0.000 |
| Mn             | 3 | 3  | mg/L  | 0.050               | 0.026 | 1.458  | 0.000 | 0.030 | 0.080 | -3.084                      | 0.504 | 1.120  | 0.000 |
| Co             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |
| Cu             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |
| Fe             | 3 | 3  | mg/L  | 0.520               | 0.106 | -1.458 | 0.000 | 0.400 | 0.600 | -0.669                      | 0.217 | -1.537 | 0.000 |
| Pb             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |
| Cr             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| Zn             | 3 | 3  | mg/L  | 0.010 | 0.013                        | 0.013    | 0.013 | LN    | 0.014         | 0.160 | LN                   | 0.014 | 0.400 | 0.750 |
| Cd             | 3 | 1  | mg/L  | 0.005 | 0.004                        | 0.002    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Mn             | 3 | 3  | mg/L  | 0.010 | 0.050                        | 0.050    | 0.050 | LN    | 0.052         | 0.254 | N/A                  | 0.000 | 0.000 | 0.000 |
| Co             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Cu             | 3 | 0  | mg/L  | 0.005 | 0.005                        | 0.002    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Fe             | 3 | 3  | mg/L  | 0.020 | 0.520                        | 0.520    | 0.520 | LN    | 0.520         | 0.047 | N/A                  | 0.000 | 0.000 | 0.000 |
| Pb             | 3 | 0  | mg/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Cr             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       |         |          | Weighted Ave. with Cu values |       |         |       | MLE Estimates |         | Regression Estimates |  |  |  |
|----------------|---|----|-------|------------------------|-------|---------|----------|------------------------------|-------|---------|-------|---------------|---------|----------------------|--|--|--|
|                |   |    |       | Mean                   | TStd  | Cu=DL   | Cu=0.5DL | Cu=0                         | Trans | Mean    | X     | Trans         | Mean    | X                    |  |  |  |
| Zn             | 0 | 0  | g/d   | 0.000                  | 0.000 | 759.000 | 759.000  | 759.000                      | LN    | 818.000 | 0.584 | LN            | 818.000 | 0.621                |  |  |  |
| Cd             | 0 | 0  | g/d   | 0.000                  | 0.000 | 216.000 | 117.000  | 19.300                       | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                |  |  |  |
| Mn             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 2.920   | 2.920    | 2.920                        | LN    | 3.040   | 0.595 | N/A           | 0.000   | 0.000                |  |  |  |
| Co             | 0 | 0  | g/d   | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                |  |  |  |
| Cu             | 0 | 0  | g/d   | 0.000                  | 0.000 | 292.000 | 146.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                |  |  |  |
| Fe             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 30.400  | 30.400   | 30.400                       | LN    | 30.400  | 0.577 | N/A           | 0.000   | 0.000                |  |  |  |
| Pb             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 2.920   | 1.460    | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                |  |  |  |
| Cr             | 0 | 0  | g/d   | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                |  |  |  |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |            |          | Units | Loading Estimates |            |          |
|----------------|-------|-------------------------|------------|----------|-------|-------------------|------------|----------|
|                |       | Mean                    | Confidence | Interval |       | Mean              | Confidence | Interval |
| Zn             | mg/L  | 0.014                   | 0.012      | 0.017    | g/d   | 818.00            | 261.00     | 2570.00  |
| Cd             | mg/L  | 0.002#                  |            |          | g/d   | 117.00#           |            |          |
| Mn             | mg/L  | 0.052                   | 0.039      | 0.069    | kg/d  | 3.04              | 0.95       | 9.75     |
| Co             | mg/L  | NC                      |            |          | g/d   | NC                |            |          |
| Cu             | mg/L  | NC                      |            |          | g/d   | NC                |            |          |
| Fe             | mg/L  | 0.520                   | 0.490      | 0.550    | kg/d  | 30.40             | 9.81       | 94.20    |
| Pb             | mg/L  | NC                      |            |          | kg/d  | NC                |            |          |
| Cr             | mg/L  | NC                      |            |          | g/d   | NC                |            |          |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL



## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 3: Concentration file: algo3.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-3

Number: 1

Mean flow (QBAR): 26300000. L/d Std: 20400000. Skew: 1.32 Kurt: 4.71 Flow points: 12 (LogStd or TStd: 0.795)

| Statistical Analysis of Detected Concentrations |                     |    |       |       |       |                             |       |       |       |        |       |        |       |
|-------------------------------------------------|---------------------|----|-------|-------|-------|-----------------------------|-------|-------|-------|--------|-------|--------|-------|
| Parameter Code                                  | Raw data statistics |    |       | Range |       | Log(e) Transform Statistics |       |       |       |        |       |        |       |
|                                                 | N                   | ND | Units | Mean  | Std   | Skew                        | Kurt  | Min   | Max   | Mean   | Std   | Skew   | Kurt  |
| Zn                                              | 3                   | 3  | mg/L  | 0.035 | 0.009 | -1.732                      | 0.000 | 0.025 | 0.040 | -3.376 | 0.271 | -1.732 | 0.000 |
| Cd                                              | 3                   | 0  | mg/L  | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000 |
| Mn                                              | 3                   | 3  | mg/L  | 0.077 | 0.015 | -0.935                      | 0.000 | 0.060 | 0.090 | -2.582 | 0.209 | -1.132 | 0.000 |
| Co                                              | 3                   | 0  | mg/L  | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000 |
| Cu                                              | 3                   | 0  | mg/L  | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000 |
| Fe                                              | 3                   | 3  | mg/L  | 0.717 | 0.251 | 0.473                       | 0.000 | 0.480 | 0.980 | -0.375 | 0.357 | -0.051 | 0.000 |
| Pb                                              | 3                   | 0  | mg/L  | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000 |
| Cr                                              | 3                   | 0  | mg/L  | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000 |

| Parameter<br>Code | Mean Concentration Estimates (CBAR) |    |       |       |          |           |           |       |       |               |       |       |                      |       |      |
|-------------------|-------------------------------------|----|-------|-------|----------|-----------|-----------|-------|-------|---------------|-------|-------|----------------------|-------|------|
|                   |                                     |    |       |       | Weighted | Ave. with | Cu values |       |       | MLE Estimates |       |       | Regression Estimates |       | R**2 |
|                   | N                                   | ND | Units | DL    | Cu=DL    | Cu=0.5DL  | Cu=0      | Trans | Mean  | TStd          | Trans | Mean  | TStd                 |       |      |
| Zn                | 3                                   | 3  | mg/L  | 0.010 | 0.035    | 0.035     | 0.035     | LN    | 0.035 | 0.074         | LN    | 0.035 | 0.271                | 0.750 |      |
| Cd                | 3                                   | 0  | mg/L  | 0.005 | 0.005    | 0.002     | 0.000     | N/A   | 0.000 | 0.000         | N/A   | 0.000 | 0.000                | 0.000 |      |
| Mn                | 3                                   | 3  | mg/L  | 0.010 | 0.077    | 0.077     | 0.077     | LN    | 0.077 | 0.044         | LN    | 0.077 | 0.209                | 0.945 |      |
| Co                | 3                                   | 0  | mg/L  | 0.010 | 0.010    | 0.005     | 0.000     | N/A   | 0.000 | 0.000         | N/A   | 0.000 | 0.000                | 0.000 |      |
| Cu                | 3                                   | 0  | mg/L  | 0.005 | 0.005    | 0.002     | 0.000     | N/A   | 0.000 | 0.000         | N/A   | 0.000 | 0.000                | 0.000 |      |
| Fe                | 3                                   | 3  | mg/L  | 0.020 | 0.720    | 0.720     | 0.720     | LN    | 0.730 | 0.127         | LN    | 0.730 | 0.357                | 1.000 |      |
| Pb                | 3                                   | 0  | mg/L  | 0.050 | 0.050    | 0.025     | 0.000     | N/A   | 0.000 | 0.000         | N/A   | 0.000 | 0.000                | 0.000 |      |
| Cr                | 3                                   | 0  | mg/L  | 0.010 | 0.010    | 0.005     | 0.000     | N/A   | 0.000 | 0.000         | N/A   | 0.000 | 0.000                | 0.000 |      |

| Parameter<br>Code | Instantaneous Loadings |    |       |       | Weighted<br>Cu=DL | Loading Estimates: Load=QBAR*CBAR |                     |         | MLE Estimates |         |       | Regression Estimates |         |       |
|-------------------|------------------------|----|-------|-------|-------------------|-----------------------------------|---------------------|---------|---------------|---------|-------|----------------------|---------|-------|
|                   | N                      | ND | Units | Mean  |                   | TStd                              | Ave. with Cu values |         | Trans         | Mean    | X     | Trans                | Mean    | X     |
|                   |                        |    |       |       |                   |                                   | Cu=0.5DL            | Cu=0    |               |         |       |                      |         |       |
| Zn                | 0                      | 0  | g/d   | 0.000 | 0.000             | 921.000                           | 921.000             | 921.000 | LN            | 921.000 | 0.233 | LN                   | 921.000 | 0.278 |
| Cd                | 0                      | 0  | g/d   | 0.000 | 0.000             | 132.000                           | 65.800              | 0.000   | N/A           | 0.000   | 0.000 | N/A                  | 0.000   | 0.000 |
| Mn                | 0                      | 0  | kg/d  | 0.000 | 0.000             | 2.030                             | 2.030               | 2.030   | LN            | 2.030   | 0.231 | LN                   | 2.030   | 0.259 |
| Co                | 0                      | 0  | g/d   | 0.000 | 0.000             | 263.000                           | 132.000             | 0.000   | N/A           | 0.000   | 0.000 | N/A                  | 0.000   | 0.000 |
| Cu                | 0                      | 0  | g/d   | 0.000 | 0.000             | 132.000                           | 65.800              | 0.000   | N/A           | 0.000   | 0.000 | N/A                  | 0.000   | 0.000 |
| Fe                | 0                      | 0  | kg/d  | 0.000 | 0.000             | 18.900                            | 18.900              | 18.900  | LN            | 19.200  | 0.241 | LN                   | 19.200  | 0.308 |
| Pb                | 0                      | 0  | kg/d  | 0.000 | 0.000             | 1.320                             | 0.660               | 0.000   | N/A           | 0.000   | 0.000 | N/A                  | 0.000   | 0.000 |
| Cr                | 0                      | 0  | g/d   | 0.000 | 0.000             | 263.000                           | 132.000             | 0.000   | N/A           | 0.000   | 0.000 | N/A                  | 0.000   | 0.000 |

| Summary of Mean Concentration and Total Loading Estimates |                         |       |                     |                   |        |                     |  |  |  |  |  |  |  |
|-----------------------------------------------------------|-------------------------|-------|---------------------|-------------------|--------|---------------------|--|--|--|--|--|--|--|
| Parameter Code                                            | Concentration Estimates |       |                     | Loading Estimates |        |                     |  |  |  |  |  |  |  |
|                                                           | Units                   | Mean  | Confidence Interval | Units             | Mean   | Confidence Interval |  |  |  |  |  |  |  |
| Zn                                                        | mg/L                    | 0.035 | 0.032 0.038         | g/d               | 921.00 | 583.00 1450.00      |  |  |  |  |  |  |  |
| Cd                                                        | mg/L                    | NC    |                     | g/d               | NC     |                     |  |  |  |  |  |  |  |
| Mn                                                        | mg/L                    | 0.077 | 0.073 0.081         | kg/d              | 2.03   | 1.29 3.19           |  |  |  |  |  |  |  |
| Co                                                        | mg/L                    | NC    |                     | g/d               | NC     |                     |  |  |  |  |  |  |  |
| Cu                                                        | mg/L                    | NC    |                     | g/d               | NC     |                     |  |  |  |  |  |  |  |
| Fe                                                        | mg/L                    | 0.730 | 0.630 0.840         | kg/d              | 19.20  | 12.00 30.80         |  |  |  |  |  |  |  |
| Pb                                                        | mg/L                    | NC    |                     | kg/d              | NC     |                     |  |  |  |  |  |  |  |
| Cr                                                        | mg/L                    | NC    |                     | g/d               | NC     |                     |  |  |  |  |  |  |  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 4: Concentration file: algo3.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-4

Number: 1

Mean flow (QBAR): 88600. L/d Std: 105000. Skew: 1.42 Kurt: 6.51 Flow points: 8 (LogStd or TStd: 1.730)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |        |       | Range |       | Log(e) Transform Statistics |       |        |       |
|----------------|---|----|-------|---------------------|-------|--------|-------|-------|-------|-----------------------------|-------|--------|-------|
|                |   |    |       | Mean                | Std   | Skew   | Kurt  | Min   | Max   | Mean                        | Std   | Skew   | Kurt  |
| Zn             | 3 | 2  | mg/L  | 0.020               | 0.000 | 0.000  | 0.000 | 0.020 | 0.020 | -3.912                      | 0.000 | 0.000  | 0.000 |
| Cd             | 3 | 1  | mg/L  | 0.001               | 0.000 | 0.000  | 0.000 | 0.001 | 0.001 | -6.908                      | 0.000 | 0.000  | 0.000 |
| Mn             | 3 | 3  | mg/L  | 0.897               | 0.630 | -1.724 | 0.000 | 0.170 | 1.280 | -0.437                      | 1.157 | -1.731 | 0.000 |
| Co             | 3 | 2  | mg/L  | 0.030               | 0.000 | 0.000  | 0.000 | 0.030 | 0.030 | -3.507                      | 0.000 | 0.000  | 0.000 |
| Cu             | 3 | 2  | mg/L  | 0.007               | 0.000 | 0.000  | 0.000 | 0.005 | 0.010 | -4.952                      | 0.000 | 0.000  | 0.000 |
| Fe             | 3 | 3  | mg/L  | 1.067               | 1.159 | 1.674  | 0.000 | 0.300 | 2.400 | -0.341                      | 1.084 | 1.309  | 0.000 |
| Pb             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |
| Cr             | 3 | 3  | mg/L  | 0.037               | 0.006 | -1.732 | 0.000 | 0.030 | 0.040 | -3.315                      | 0.166 | -1.732 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| Zn             | 3 | 2  | mg/L  | 0.010 | 0.017                        | 0.015    | 0.013 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Cd             | 3 | 1  | mg/L  | 0.005 | 0.004                        | 0.002    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Mn             | 3 | 3  | mg/L  | 0.010 | 0.900                        | 0.900    | 0.900 | LN    | 1.260         | 1.338 | LN                   | 1.260 | 1.157 | 0.762 |
| Co             | 3 | 2  | mg/L  | 0.010 | 0.023                        | 0.022    | 0.020 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Cu             | 3 | 2  | mg/L  | 0.005 | 0.007                        | 0.006    | 0.005 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Fe             | 3 | 3  | mg/L  | 0.020 | 1.070                        | 1.070    | 1.070 | LN    | 1.280         | 1.174 | LN                   | 1.280 | 1.084 | 0.921 |
| Pb             | 3 | 0  | mg/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Cr             | 3 | 3  | mg/L  | 0.010 | 0.037                        | 0.037    | 0.037 | LN    | 0.037         | 0.028 | LN                   | 0.037 | 0.166 | 0.750 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | Instantaneous Loadings |    |       |       |       | Weighted Ave. with Cu values |          |         |       | MLE Estimates |       | Regression Estimates |         |       |  |
|----------------|------------------------|----|-------|-------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|---------|-------|--|
|                | N                      | ND | Units | Mean  | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans | Mean          | X     | Trans                | Mean    | X     |  |
| Zn             | 0                      | 0  | g/d   | 0.000 | 0.000 | 1.510                        | 1.330    | 1.150   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |  |
| Cd             | 0                      | 0  | mg/d  | 0.000 | 0.000 | 328.000                      | 177.000  | 29.200  | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |  |
| Mn             | 0                      | 0  | g/d   | 0.000 | 0.000 | 79.700                       | 79.700   | 79.700  | LN    | 112.000       | 0.985 | LN                   | 112.000 | 0.906 |  |
| Co             | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.040                        | 1.950    | 1.770   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |  |
| Cu             | 0                      | 0  | mg/d  | 0.000 | 0.000 | 594.000                      | 514.000  | 443.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |  |
| Fe             | 0                      | 0  | g/d   | 0.000 | 0.000 | 94.800                       | 94.800   | 94.800  | LN    | 113.000       | 0.913 | LN                   | 113.000 | 0.875 |  |
| Pb             | 0                      | 0  | g/d   | 0.000 | 0.000 | 4.430                        | 2.210    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |  |
| Cr             | 0                      | 0  | g/d   | 0.000 | 0.000 | 3.280                        | 3.280    | 3.280   | LN    | 3.280         | 0.612 | LN                   | 3.280   | 0.619 |  |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |       | Units | Loading Estimates |                     |        |
|----------------|-------|-------------------------|---------------------|-------|-------|-------------------|---------------------|--------|
|                |       | Mean                    | Confidence Interval |       |       | Mean              | Confidence Interval |        |
| Zn             | mg/L  | 0.015#                  |                     |       | g/d   | 1.33#             |                     |        |
| Cd             | mg/L  | 0.002#                  |                     |       | mg/d  | 177.00#           |                     |        |
| Mn             | mg/L  | 1.260                   | 0.280               | 5.720 | g/d   | 112.00            | 16.20               | 772.00 |
| Co             | mg/L  | 0.022#                  |                     |       | g/d   | 1.95#             |                     |        |
| Cu             | mg/L  | 0.006#                  |                     |       | mg/d  | 514.00#           |                     |        |
| Fe             | mg/L  | 1.280                   | 0.340               | 4.830 | g/d   | 113.00            | 18.90               | 677.00 |
| Pb             | mg/L  | NC                      |                     |       | g/d   | NC                |                     |        |
| Cr             | mg/L  | 0.037                   | 0.036               | 0.038 | g/d   | 3.28              | 0.99                | 10.90  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 5: Concentration file: algo3.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-5

Number: 1

Mean flow (QBAR): 339000. L/d Std: 144000. Skew: -1.33 Kurt: 10.23 Flow points: 5 (LogStd or TStd: 0.614)

| Statistical Analysis of Detected Concentrations |   |    |       |                     |       |        |       |       |       |                             |       |        |       |
|-------------------------------------------------|---|----|-------|---------------------|-------|--------|-------|-------|-------|-----------------------------|-------|--------|-------|
| Parameter Code                                  |   |    |       | Raw data statistics |       |        |       | Range |       | Log(e) Transform Statistics |       |        |       |
|                                                 | N | ND | Units | Mean                | Std   | Skew   | Kurt  | Min   | Max   | Mean                        | Std   | Skew   | Kurt  |
| Zn                                              | 3 | 3  | mg/L  | 0.020               | 0.000 | 0.000  | 0.000 | 0.020 | 0.020 | -3.912                      | 0.000 | 0.000  | 0.000 |
| Cd                                              | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |
| Mn                                              | 3 | 3  | mg/L  | 0.235               | 0.005 | 0.000  | 0.000 | 0.230 | 0.240 | -1.448                      | 0.021 | -0.032 | 0.000 |
| Co                                              | 3 | 2  | mg/L  | 0.050               | 0.000 | 0.000  | 0.000 | 0.040 | 0.060 | -3.016                      | 0.000 | 0.000  | 0.000 |
| Cu                                              | 3 | 3  | mg/L  | 0.009               | 0.001 | -1.732 | 0.000 | 0.008 | 0.010 | -4.680                      | 0.129 | -1.732 | 0.000 |
| Fe                                              | 3 | 3  | mg/L  | 0.767               | 0.578 | 1.403  | 0.000 | 0.320 | 1.420 | -0.456                      | 0.753 | 0.719  | 0.000 |
| Pb                                              | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000  | 0.000 |
| Cr                                              | 3 | 3  | mg/L  | 0.065               | 0.005 | 0.000  | 0.000 | 0.060 | 0.070 | -2.735                      | 0.077 | -0.115 | 0.000 |

| Mean Concentration Estimates (CBAR) |   |    |       |                              |       |          |       |               |       |                      |       |       |       |
|-------------------------------------|---|----|-------|------------------------------|-------|----------|-------|---------------|-------|----------------------|-------|-------|-------|
| Parameter Code                      |   |    |       | Weighted Ave. with Cu values |       |          |       | MLE Estimates |       | Regression Estimates |       |       |       |
|                                     | N | ND | Units | DL                           | Cu=DL | Cu=0.5DL | Cu=0  | Trans         | Mean  | TStd                 | Trans | Mean  | TStd  |
| Zn                                  | 3 | 3  | mg/L  | 0.010                        | 0.020 | 0.020    | 0.020 | LN            | 0.020 | 0.000                | N/A   | 0.000 | 0.000 |
| Cd                                  | 3 | 0  | mg/L  | 0.005                        | 0.005 | 0.002    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Mn                                  | 3 | 3  | mg/L  | 0.010                        | 0.240 | 0.240    | 0.240 | LN            | 0.240 | 0.000                | N/A   | 0.000 | 0.000 |
| Co                                  | 3 | 2  | mg/L  | 0.010                        | 0.037 | 0.035    | 0.033 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Cu                                  | 3 | 3  | mg/L  | 0.005                        | 0.009 | 0.009    | 0.009 | LN            | 0.009 | 0.017                | LN    | 0.009 | 0.129 |
| Fe                                  | 3 | 3  | mg/L  | 0.020                        | 0.770 | 0.770    | 0.770 | LN            | 0.840 | 0.567                | LN    | 0.840 | 0.753 |
| Pb                                  | 3 | 0  | mg/L  | 0.050                        | 0.050 | 0.025    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Cr                                  | 3 | 3  | mg/L  | 0.010                        | 0.065 | 0.065    | 0.065 | LN            | 0.065 | 0.006                | LN    | 0.065 | 0.077 |

| Loading Estimates: Load=QBAR*CBAR |   |    |       |                        |       |         |          |                              |       |               |       |                      |         |
|-----------------------------------|---|----|-------|------------------------|-------|---------|----------|------------------------------|-------|---------------|-------|----------------------|---------|
| Parameter Code                    |   |    |       | Instantaneous Loadings |       |         |          | Weighted Ave. with Cu values |       | MLE Estimates |       | Regression Estimates |         |
|                                   | N | ND | Units | Mean                   | TStd  | Cu=DL   | Cu=0.5DL | Cu=0                         | Trans | Mean          | X     | Trans                | Mean    |
| Zn                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 6.780   | 6.780    | 6.780                        | LN    | 6.780         | 0.275 | N/A                  | 0.000   |
| Cd                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 1.690   | 0.850    | 0.000                        | N/A   | 0.000         | 0.000 | N/A                  | 0.000   |
| Mn                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 81.400  | 81.400   | 81.400                       | LN    | 81.400        | 0.275 | N/A                  | 0.000   |
| Co                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 12.500  | 11.900   | 11.200                       | N/A   | 0.000         | 0.000 | N/A                  | 0.000   |
| Cu                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 3.150   | 3.150    | 3.150                        | LN    | 3.190         | 0.275 | LN                   | 3.190   |
| Fe                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 261.000 | 261.000  | 261.000                      | LN    | 285.000       | 0.427 | LN                   | 285.000 |
| Pb                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 17.000  | 8.480    | 0.000                        | N/A   | 0.000         | 0.000 | N/A                  | 0.000   |
| Cr                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 22.000  | 22.000   | 22.000                       | LN    | 22.000        | 0.275 | LN                   | 22.000  |

| Summary of Mean Concentration and Total Loading Estimates |       |       |                     |                         |      |                     |                   |        |                     |       |      |                     |       |
|-----------------------------------------------------------|-------|-------|---------------------|-------------------------|------|---------------------|-------------------|--------|---------------------|-------|------|---------------------|-------|
| Parameter Code                                            |       |       |                     | Concentration Estimates |      |                     | Loading Estimates |        |                     |       |      |                     |       |
|                                                           | Units | Mean  | Confidence Interval | Units                   | Mean | Confidence Interval | Units             | Mean   | Confidence Interval | Units | Mean | Confidence Interval | Units |
| Zn                                                        | mg/L  | 0.020 | 0.020               | 0.020                   | g/d  | 6.78                | 3.96              | 11.60  |                     |       |      |                     |       |
| Cd                                                        | mg/L  | NC    |                     |                         | g/d  | NC                  |                   |        |                     |       |      |                     |       |
| Mn                                                        | mg/L  | 0.240 | 0.240               | 0.240                   | g/d  | 81.40               | 47.50             | 139.00 |                     |       |      |                     |       |
| Co                                                        | mg/L  | 0.035 |                     |                         | g/d  | 11.90               |                   |        |                     |       |      |                     |       |
| Cu                                                        | mg/L  | 0.009 | 0.009               | 0.010                   | g/d  | 3.19                | 1.86              | 5.47   |                     |       |      |                     |       |
| Fe                                                        | mg/L  | 0.840 | 0.440               | 1.590                   | g/d  | 285.00              | 123.00            | 658.00 |                     |       |      |                     |       |
| Pb                                                        | mg/L  | NC    |                     |                         | g/d  | NC                  |                   |        |                     |       |      |                     |       |
| Cr                                                        | mg/L  | 0.065 | 0.065               | 0.065                   | g/d  | 22.00               | 12.80             | 37.70  |                     |       |      |                     |       |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 1: Concentration file: algo4.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-1

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |       |        | Range  |        | Log(e) Transform Statistics |       |       |        |
|----------------|---|----|-------|---------------------|-------|-------|--------|--------|--------|-----------------------------|-------|-------|--------|
|                |   |    |       | Mean                | Std   | Skew  | Kurt   | Min    | Max    | Mean                        | Std   | Skew  | Kurt   |
| Ni             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000 | 0.000  |
| Be             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000 | 0.000  |
| Mo             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000 | 0.000  |
| Ca             | 5 | 5  | mg/L  | 18.500              | 7.805 | 1.863 | 11.857 | 12.000 | 32.000 | 2.859                       | 0.367 | 1.410 | 10.792 |
| V              | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000 | 0.000  |
| Al             | 3 | 3  | mg/L  | 0.207               | 0.050 | 0.586 | 0.000  | 0.160  | 0.260  | -1.596                      | 0.243 | 0.241 | 0.000  |
| Mg             | 5 | 5  | mg/L  | 3.880               | 1.548 | 2.040 | 12.311 | 2.800  | 6.600  | 1.305                       | 0.338 | 1.833 | 11.636 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |        |       | MLE Estimates |       | Regression Estimates |        |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|--------|-------|---------------|-------|----------------------|--------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans | Mean          | TStd  | Trans                | Mean   | TStd  | R**2  |
| Ni             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Be             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Mo             | 3 | 0  | mg/L  | 0.020 | 0.020                        | 0.010    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Ca             | 5 | 5  | mg/L  | 0.050 | 18.500                       | 18.500   | 18.500 | LN    | 18.700        | 0.134 | LN                   | 18.700 | 0.367 | 0.820 |
| V              | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Al             | 3 | 3  | mg/L  | 0.020 | 0.210                        | 0.210    | 0.210  | LN    | 0.210         | 0.059 | LN                   | 0.210  | 0.243 | 0.998 |
| Mg             | 5 | 5  | mg/L  | 0.050 | 3.880                        | 3.880    | 3.880  | LN    | 3.900         | 0.114 | LN                   | 3.900  | 0.338 | 0.759 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | Instantaneous Loadings |       |       | TStd  | Weighted Ave. with Cu values |          |          | MLE Estimates |          |       | Regression Estimates |          |       |
|----------------|---|------------------------|-------|-------|-------|------------------------------|----------|----------|---------------|----------|-------|----------------------|----------|-------|
|                |   | ND                     | Units | Mean  |       | Cu=DL                        | Cu=0.5DL | Cu=0     | Trans         | Mean     | X     | Trans                | Mean     | X     |
| Ni             | 0 | 0                      | g/d   | 0.000 | 0.000 | 584.000                      | 292.000  | 0.000    | N/A           | 0.000    | 0.000 | N/A                  | 0.000    | 0.000 |
| Be             | 0 | 0                      | g/d   | 0.000 | 0.000 | 584.000                      | 292.000  | 0.000    | N/A           | 0.000    | 0.000 | N/A                  | 0.000    | 0.000 |
| Mo             | 0 | 0                      | kg/d  | 0.000 | 0.000 | 1.170                        | 0.580    | 0.000    | N/A           | 0.000    | 0.000 | N/A                  | 0.000    | 0.000 |
| Ca             | 0 | 0                      | kg/d  | 0.000 | 0.000 | 1080.000                     | 1080.000 | 1080.000 | LN            | 1090.000 | 0.579 | LN                   | 1090.000 | 0.599 |
| V              | 0 | 0                      | g/d   | 0.000 | 0.000 | 584.000                      | 292.000  | 0.000    | N/A           | 0.000    | 0.000 | N/A                  | 0.000    | 0.000 |
| Al             | 0 | 0                      | kg/d  | 0.000 | 0.000 | 12.300                       | 12.300   | 12.300   | LN            | 12.300   | 0.577 | LN                   | 12.300   | 0.593 |
| Mg             | 0 | 0                      | kg/d  | 0.000 | 0.000 | 227.000                      | 227.000  | 227.000  | LN            | 228.000  | 0.579 | LN                   | 228.000  | 0.596 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |  | Units | Loading Estimates |                     |  |
|----------------|-------|-------------------------|---------------------|--|-------|-------------------|---------------------|--|
|                |       | Mean                    | Confidence Interval |  |       | Mean              | Confidence Interval |  |
| Ni             | mg/L  | NC                      |                     |  | g/d   | NC                |                     |  |
| Be             | mg/L  | NC                      |                     |  | g/d   | NC                |                     |  |
| Mo             | mg/L  | NC                      |                     |  | kg/d  | NC                |                     |  |
| Ca             | mg/L  | 18.700                  | 16.600 21.000       |  | kg/d  | 1090.00           | 350.00 3390.00      |  |
| V              | mg/L  | NC                      |                     |  | g/d   | NC                |                     |  |
| Al             | mg/L  | 0.210                   | 0.200 0.220         |  | kg/d  | 12.30             | 3.97 38.10          |  |
| Mg             | mg/L  | 3.900                   | 3.530 4.310         |  | kg/d  | 228.00            | 73.40 709.00        |  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 2: Concentration file: algo4.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-2

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Mean   | Raw data statistics |        |        | Range |        | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|--------|---------------------|--------|--------|-------|--------|-----------------------------|-------|--------|--------|
|                |   |    |       |        | Std                 | Skew   | Kurt   | Min   | Max    | Mean                        | Std   | Skew   | Kurt   |
| Ni             | 3 | 0  | mg/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Be             | 3 | 0  | mg/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Mo             | 3 | 0  | mg/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Ca             | 5 | 5  | mg/L  | 10.280 | 4.160               | 2.205  | 12.887 | 8.100 | 17.700 | 2.279                       | 0.334 | 2.170  | 12.756 |
| V              | 3 | 0  | mg/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Al             | 3 | 3  | mg/L  | 0.297  | 0.105               | -0.143 | 0.000  | 0.190 | 0.400  | -1.260                      | 0.375 | -0.660 | 0.000  |
| Mg             | 5 | 5  | mg/L  | 2.434  | 0.883               | 2.141  | 12.657 | 1.900 | 4.000  | 0.847                       | 0.307 | 2.049  | 12.330 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |        | MLE Estimates |        | Regression Estimates |       |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|--------|---------------|--------|----------------------|-------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans         | Mean   | TStd                 | Trans | Mean  | TStd  | R**2  |
| Ni             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A           | 0.000  | 0.000                | N/A   | 0.000 | 0.000 | 0.000 |
| Be             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A           | 0.000  | 0.000                | N/A   | 0.000 | 0.000 | 0.000 |
| Mo             | 3 | 0  | mg/L  | 0.020 | 0.020                        | 0.010    | 0.000  | N/A           | 0.000  | 0.000                | N/A   | 0.000 | 0.000 | 0.000 |
| Ca             | 5 | 5  | mg/L  | 0.050 | 10.300                       | 10.300   | 10.300 | LN            | 10.300 | 0.112                | N/A   | 0.000 | 0.000 | 0.000 |
| V              | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A           | 0.000  | 0.000                | N/A   | 0.000 | 0.000 | 0.000 |
| Al             | 3 | 3  | mg/L  | 0.020 | 0.300                        | 0.300    | 0.300  | LN            | 0.300  | 0.141                | LN    | 0.300 | 0.375 | 0.983 |
| Mg             | 5 | 5  | mg/L  | 0.050 | 2.430                        | 2.430    | 2.430  | LN            | 2.450  | 0.094                | LN    | 2.450 | 0.307 | 0.680 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       | Weighted Ave. with Cu values |          |         | MLE Estimates |         | Regression Estimates |       |         |       |
|----------------|---|----|-------|------------------------|-------|------------------------------|----------|---------|---------------|---------|----------------------|-------|---------|-------|
|                |   |    |       | Mean                   | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans         | Mean    | X                    | Trans | Mean    | X     |
| Ni             | 0 | 0  | g/d   | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Be             | 0 | 0  | g/d   | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Mo             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 1.170                        | 0.580    | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Ca             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 602.000                      | 602.000  | 602.000 | LN            | 602.000 | 0.578                | N/A   | 0.000   | 0.000 |
| V              | 0 | 0  | g/d   | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Al             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 17.500                       | 17.500   | 17.500  | LN            | 17.500  | 0.582                | LN    | 17.500  | 0.616 |
| Mg             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 142.000                      | 142.000  | 142.000 | LN            | 143.000 | 0.578                | LN    | 143.000 | 0.592 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |        | Units | Loading Estimates |                     |         |
|----------------|-------|-------------------------|---------------------|--------|-------|-------------------|---------------------|---------|
|                |       | Mean                    | Confidence Interval |        |       | Mean              | Confidence Interval |         |
| Ni             | mg/L  | NC                      |                     |        | g/d   | NC                |                     |         |
| Be             | mg/L  | NC                      |                     |        | g/d   | NC                |                     |         |
| Mo             | mg/L  | NC                      |                     |        | kg/d  | NC                |                     |         |
| Ca             | mg/L  | 10.300                  | 9.340               | 11.400 | kg/d  | 602.00            | 194.00              | 1870.00 |
| V              | mg/L  | NC                      |                     |        | g/d   | NC                |                     |         |
| Al             | mg/L  | 0.300                   | 0.260               | 0.350  | kg/d  | 17.50             | 5.59                | 54.80   |
| Mg             | mg/L  | 2.450                   | 2.260               | 2.660  | kg/d  | 143.00            | 46.10               | 444.00  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 3: Concentration file: algo4.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-3

Number: 1

Mean flow (QBAR): 26300000. L/d Std: 20400000. Skew: 1.32 Kurt: 4.71 Flow points: 12 (LogStd or TStd: 0.795)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |        |        | Range  |        | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|---------------------|-------|--------|--------|--------|--------|-----------------------------|-------|--------|--------|
|                |   |    |       | Mean                | Std   | Skew   | Kurt   | Min    | Max    | Mean                        | Std   | Skew   | Kurt   |
| Ni             | 3 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Be             | 2 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Mo             | 2 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Ca             | 4 | 4  | mg/L  | 13.000              | 1.463 | -0.971 | 15.349 | 11.000 | 14.500 | 2.560                       | 0.116 | -1.149 | 15.597 |
| V              | 2 | 0  | mg/L  | 0.000               | 0.000 | 0.000  | 0.000  | 0.000  | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Al             | 2 | 2  | mg/L  | 0.470               | 0.000 | 0.000  | 0.000  | 0.420  | 0.520  | -0.761                      | 0.000 | 0.000  | 0.000  |
| Mg             | 4 | 4  | mg/L  | 3.200               | 0.356 | -1.331 | 15.000 | 2.700  | 3.500  | 1.158                       | 0.116 | -1.431 | 15.368 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |        |       | MLE Estimates |       | Regression Estimates |        |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|--------|-------|---------------|-------|----------------------|--------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans | Mean          | TStd  | Trans                | Mean   | TStd  | R**2  |
| Ni             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Be             | 2 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Mo             | 2 | 0  | mg/L  | 0.020 | 0.020                        | 0.010    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Ca             | 4 | 4  | mg/L  | 0.050 | 13.000                       | 13.000   | 13.000 | LN    | 13.000        | 0.014 | LN                   | 13.000 | 0.116 | 0.890 |
| V              | 2 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Al             | 2 | 2  | mg/L  | 0.020 | 0.470                        | 0.470    | 0.470  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Mg             | 4 | 4  | mg/L  | 0.050 | 3.200                        | 3.200    | 3.200  | LN    | 3.210         | 0.013 | LN                   | 3.210  | 0.116 | 0.870 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       |         |          | Weighted Ave. with Cu values |       |         |       | MLE Estimates |         | Regression Estimates |       |         |       |
|----------------|---|----|-------|------------------------|-------|---------|----------|------------------------------|-------|---------|-------|---------------|---------|----------------------|-------|---------|-------|
|                |   |    |       | Mean                   | TStd  | Cu=DL   | Cu=0.5DL | Cu=0                         | Trans | Mean    | X     | Trans         | Mean    | X                    | Trans | Mean    | X     |
| Ni             | 0 | 0  | g/d   | 0.000                  | 0.000 | 263.000 | 132.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Be             | 0 | 0  | g/d   | 0.000                  | 0.000 | 263.000 | 132.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Mo             | 0 | 0  | g/d   | 0.000                  | 0.000 | 526.000 | 263.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Ca             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 342.000 | 342.000  | 342.000                      | LN    | 342.000 | 0.229 | LN            | 342.000 | 0.237                | LN    | 342.000 | 0.237 |
| V              | 0 | 0  | g/d   | 0.000                  | 0.000 | 263.000 | 132.000  | 0.000                        | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Al             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 12.400  | 12.400   | 12.400                       | N/A   | 0.000   | 0.000 | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Mg             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 84.200  | 84.200   | 84.200                       | LN    | 84.400  | 0.229 | LN            | 84.400  | 0.237                | LN    | 84.400  | 0.237 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |        | Units | Loading Estimates |                     |        |
|----------------|-------|-------------------------|---------------------|--------|-------|-------------------|---------------------|--------|
|                |       | Mean                    | Confidence Interval |        |       | Mean              | Confidence Interval |        |
| Ni             | mg/L  | NC                      |                     |        | g/d   | NC                |                     |        |
| Be             | mg/L  | NC                      |                     |        | g/d   | NC                |                     |        |
| Mo             | mg/L  | NC                      |                     |        | g/d   | NC                |                     |        |
| Ca             | mg/L  | 13.000                  | 12.800              | 13.200 | kg/d  | 342.00            | 218.00              | 536.00 |
| V              | mg/L  | NC                      |                     |        | g/d   | NC                |                     |        |
| Al             | mg/L  | 0.470#                  |                     |        | kg/d  | 12.40#            |                     |        |
| Mg             | mg/L  | 3.210                   | 3.170               | 3.250  | kg/d  | 84.40             | 53.80               | 132.00 |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 4: Concentration file: algo4.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-4

Number: 1

Mean flow (QBAR): 88600. L/d Std: 105000. Skew: 1.42 Kurt: 6.51 Flow points: 8 (LogStd or TStd: 1.730)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Mean    | Raw data statistics |        |        | Range   |         | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|---------|---------------------|--------|--------|---------|---------|-----------------------------|-------|--------|--------|
|                |   |    |       |         | Std                 | Skew   | Kurt   | Min     | Max     | Mean                        | Std   | Skew   | Kurt   |
| Ni             | 3 | 3  | mg/L  | 0.017   | 0.006               | -1.732 | 0.000  | 0.010   | 0.020   | -4.143                      | 0.400 | -1.732 | 0.000  |
| Be             | 2 | 0  | mg/L  | 0.000   | 0.000               | 0.000  | 0.000  | 0.000   | 0.000   | 0.000                       | 0.000 | 0.000  | 0.000  |
| Mo             | 2 | 2  | mg/L  | 0.030   | 0.000               | 0.000  | 0.000  | 0.020   | 0.040   | -3.565                      | 0.000 | 0.000  | 0.000  |
| Ca             | 4 | 4  | mg/L  | 530.000 | 60.000              | 0.370  | 9.599  | 480.000 | 600.000 | 6.268                       | 0.112 | 0.315  | 9.292  |
| V              | 2 | 2  | mg/L  | 0.035   | 0.000               | 0.000  | 0.000  | 0.030   | 0.040   | -3.363                      | 0.000 | 0.000  | 0.000  |
| Al             | 2 | 2  | mg/L  | 0.510   | 0.000               | 0.000  | 0.000  | 0.380   | 0.640   | -0.707                      | 0.000 | 0.000  | 0.000  |
| Mg             | 4 | 4  | mg/L  | 13.750  | 3.887               | -0.718 | 11.536 | 8.800   | 17.000  | 2.587                       | 0.309 | -0.987 | 12.917 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |         | Trans | MLE Estimates |       | Trans | Regression Estimates |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|---------|-------|---------------|-------|-------|----------------------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0    |       | Mean          | TStd  |       | Mean                 | TStd  | R**2  |
| Ni             | 3 | 3  | mg/L  | 0.010 | 0.017                        | 0.017    | 0.017   | LN    | 0.017         | 0.160 | LN    | 0.017                | 0.400 | 0.750 |
| Be             | 2 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000   | N/A   | 0.000         | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |
| Mo             | 2 | 2  | mg/L  | 0.020 | 0.030                        | 0.030    | 0.030   | N/A   | 0.000         | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |
| Ca             | 4 | 4  | mg/L  | 0.050 | 530.000                      | 530.000  | 530.000 | LN    | 531.000       | 0.013 | LN    | 531.000              | 0.112 | 0.893 |
| V              | 2 | 2  | mg/L  | 0.010 | 0.035                        | 0.035    | 0.035   | N/A   | 0.000         | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |
| Al             | 2 | 2  | mg/L  | 0.020 | 0.510                        | 0.510    | 0.510   | N/A   | 0.000         | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |
| Mg             | 4 | 4  | mg/L  | 0.050 | 13.700                       | 13.700   | 13.700  | LN    | 13.900        | 0.095 | LN    | 13.900               | 0.309 | 0.895 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Mean  | TStd  | Weighted Ave. with Cu values |          |        | Trans | MLE Estimates |  | X     | Regression Estimates |        |       |
|----------------|---|----|-------|-------|-------|------------------------------|----------|--------|-------|---------------|--|-------|----------------------|--------|-------|
|                |   |    |       |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   |       | Mean          |  |       | Mean                 |        | X     |
| Ni             | 0 | 0  | g/d   | 0.000 | 0.000 | 1.510                        | 1.510    | 1.510  | LN    | 1.510         |  | 0.619 | LN                   | 1.510  | 0.654 |
| Be             | 0 | 0  | mg/d  | 0.000 | 0.000 | 886.000                      | 443.000  | 0.000  | N/A   | 0.000         |  | 0.000 | N/A                  | 0.000  | 0.000 |
| Mo             | 0 | 0  | g/d   | 0.000 | 0.000 | 2.660                        | 2.660    | 2.660  | N/A   | 0.000         |  | 0.000 | N/A                  | 0.000  | 0.000 |
| Ca             | 0 | 0  | kg/d  | 0.000 | 0.000 | 47.000                       | 47.000   | 47.000 | LN    | 47.000        |  | 0.612 | LN                   | 47.000 | 0.614 |
| V              | 0 | 0  | g/d   | 0.000 | 0.000 | 3.100                        | 3.100    | 3.100  | N/A   | 0.000         |  | 0.000 | N/A                  | 0.000  | 0.000 |
| Al             | 0 | 0  | g/d   | 0.000 | 0.000 | 45.200                       | 45.200   | 45.200 | N/A   | 0.000         |  | 0.000 | N/A                  | 0.000  | 0.000 |
| Mg             | 0 | 0  | kg/d  | 0.000 | 0.000 | 1.210                        | 1.210    | 1.210  | LN    | 1.230         |  | 0.614 | LN                   | 1.230  | 0.631 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |         | Units | Loading Estimates |                     |        |
|----------------|-------|-------------------------|---------------------|---------|-------|-------------------|---------------------|--------|
|                |       | Mean                    | Confidence Interval |         |       | Mean              | Confidence Interval |        |
| Ni             | mg/L  | 0.017                   | 0.014               | 0.020   | g/d   | 1.51              | 0.45                | 5.08   |
| Be             | mg/L  | NC                      |                     |         | mg/d  | NC                |                     |        |
| Mo             | mg/L  | 0.030#                  |                     |         | g/d   | 2.66#             |                     |        |
| Ca             | mg/L  | 531.000                 | 524.000             | 538.000 | kg/d  | 47.00             | 14.20               | 156.00 |
| V              | mg/L  | 0.035#                  |                     |         | g/d   | 3.10#             |                     |        |
| Al             | mg/L  | 0.510#                  |                     |         | g/d   | 45.20#            |                     |        |
| Mg             | mg/L  | 13.900                  | 12.700              | 15.300  | kg/d  | 1.23              | 0.37                | 4.09   |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL



## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 5: Concentration file: algo4.dat  
 Analysis for outfall(s): Algoma SW-5  
 Mean flow (QBAR): 339000. L/d Std: 144000. Skew: -1.33

Discharge file: algo.flo  
 Number: 1  
 Kurt: 10.23 Flow points: 5 (LogStd or TStd: 0.614)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |         |        |        | Range   |          | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|---------------------|---------|--------|--------|---------|----------|-----------------------------|-------|--------|--------|
|                |   |    |       | Mean                | Std     | Skew   | Kurt   | Min     | Max      | Mean                        | Std   | Skew   | Kurt   |
| Ni             | 3 | 3  | mg/L  | 0.030               | 0.010   | 0.000  | 0.000  | 0.020   | 0.040    | -3.546                      | 0.348 | -0.501 | 0.000  |
| Be             | 3 | 0  | mg/L  | 0.000               | 0.000   | 0.000  | 0.000  | 0.000   | 0.000    | 0.000                       | 0.000 | 0.000  | 0.000  |
| Mo             | 3 | 3  | mg/L  | 0.067               | 0.012   | 1.732  | 0.000  | 0.060   | 0.080    | -2.718                      | 0.166 | 1.732  | 0.000  |
| Ca             | 5 | 5  | mg/L  | 1154.000            | 340.191 | 1.300  | 9.350  | 850.000 | 1700.000 | 7.019                       | 0.275 | 0.958  | 8.274  |
| V              | 4 | 4  | mg/L  | 1.212               | 2.325   | 2.000  | 17.500 | 0.050   | 4.700    | -1.860                      | 2.272 | 2.000  | 17.500 |
| Al             | 3 | 3  | mg/L  | 0.720               | 0.069   | 1.732  | 0.000  | 0.680   | 0.800    | -0.331                      | 0.094 | 1.732  | 0.000  |
| Mg             | 5 | 5  | mg/L  | 4.020               | 1.446   | -0.785 | 6.233  | 2.000   | 5.200    | 1.327                       | 0.421 | -1.060 | 7.476  |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |          |       | MLE Estimates |       | Regression Estimates |          |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|----------|-------|---------------|-------|----------------------|----------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0     | Trans | Mean          | TStd  | Trans                | Mean     | TStd  | R**2  |
| Ni             | 3 | 3  | mg/L  | 0.010 | 0.030                        | 0.030    | 0.030    | LN    | 0.031         | 0.121 | LN                   | 0.031    | 0.348 | 0.990 |
| Be             | 3 | 0  | mg/L  | 0.010 | 0.010                        | 0.005    | 0.000    | N/A   | 0.000         | 0.000 | N/A                  | 0.000    | 0.000 | 0.000 |
| Mo             | 3 | 3  | mg/L  | 0.020 | 0.067                        | 0.067    | 0.067    | LN    | 0.067         | 0.028 | LN                   | 0.067    | 0.166 | 0.750 |
| Ca             | 5 | 5  | mg/L  | 0.050 | 1150.000                     | 1150.000 | 1150.000 | LN    | 1160.000      | 0.076 | LN                   | 1160.000 | 0.275 | 0.936 |
| V              | 4 | 4  | mg/L  | 0.010 | 1.210                        | 1.210    | 1.210    | LN    | 2.060         | 5.160 | LN                   | 2.060    | 2.272 | 0.600 |
| Al             | 3 | 3  | mg/L  | 0.020 | 0.720                        | 0.720    | 0.720    | LN    | 0.720         | 0.009 | LN                   | 0.720    | 0.094 | 0.750 |
| Mg             | 5 | 5  | mg/L  | 0.050 | 4.020                        | 4.020    | 4.020    | LN    | 4.120         | 0.177 | N/A                  | 0.000    | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | Instantaneous Loadings |    |       |       |       | Weighted Ave. with Cu values |          |         | MLE Estimates |         | Regression Estimates |       |         |       |
|----------------|------------------------|----|-------|-------|-------|------------------------------|----------|---------|---------------|---------|----------------------|-------|---------|-------|
|                | N                      | ND | Units | Mean  | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans         | Mean    | X                    | Trans | Mean    | X     |
| Ni             | 0                      | 0  | g/d   | 0.000 | 0.000 | 10.200                       | 10.200   | 10.200  | LN            | 10.500  | 0.283                | LN    | 10.500  | 0.340 |
| Be             | 0                      | 0  | g/d   | 0.000 | 0.000 | 3.390                        | 1.690    | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Mo             | 0                      | 0  | g/d   | 0.000 | 0.000 | 22.700                       | 22.700   | 22.700  | LN            | 22.700  | 0.275                | LN    | 22.700  | 0.291 |
| Ca             | 0                      | 0  | kg/d  | 0.000 | 0.000 | 390.000                      | 390.000  | 390.000 | LN            | 393.000 | 0.277                | LN    | 393.000 | 0.301 |
| V              | 0                      | 0  | g/d   | 0.000 | 0.000 | 410.000                      | 410.000  | 410.000 | LN            | 698.000 | 2.595                | LN    | 698.000 | 1.169 |
| Al             | 0                      | 0  | g/d   | 0.000 | 0.000 | 244.000                      | 244.000  | 244.000 | LN            | 244.000 | 0.275                | LN    | 244.000 | 0.280 |
| Mg             | 0                      | 0  | kg/d  | 0.000 | 0.000 | 1.360                        | 1.360    | 1.360   | LN            | 1.400   | 0.286                | N/A   | 0.000   | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |          | Units | Loading Estimates |                     |           |
|----------------|-------|-------------------------|---------------------|----------|-------|-------------------|---------------------|-----------|
|                |       | Mean                    | Confidence Interval |          |       | Mean              | Confidence Interval |           |
| Ni             | mg/L  | 0.031                   | 0.027               | 0.036    | g/d   | 10.50             | 6.02                | 18.30     |
| Be             | mg/L  | NC                      |                     |          | g/d   | NC                |                     |           |
| Mo             | mg/L  | 0.067                   | 0.065               | 0.069    | g/d   | 22.70             | 13.20               | 38.90     |
| Ca             | mg/L  | 1160.000                | 1090.000            | 1240.000 | kg/d  | 393.00            | 228.00              | 676.00    |
| V              | mg/L  | 2.060                   | 0.013               | 324.000  | g/d   | 698.00            | 4.32                | 113000.00 |
| Al             | mg/L  | 0.720                   | 0.710               | 0.730    | g/d   | 244.00            | 142.00              | 418.00    |
| Mg             | mg/L  | 4.120                   | 3.530               | 4.810    | kg/d  | 1.40              | 0.80                | 2.45      |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL



## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 1: Concentration file: algo5.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-1

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |       |        | Range |        | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|---------------------|-------|-------|--------|-------|--------|-----------------------------|-------|--------|--------|
|                |   |    |       | Mean                | Std   | Skew  | Kurt   | Min   | Max    | Mean                        | Std   | Skew   | Kurt   |
| Ba             | 3 | 3  | mg/L  | 0.015               | 0.005 | 0.000 | 0.000  | 0.010 | 0.020  | -4.239                      | 0.348 | -0.501 | 0.000  |
| K              | 5 | 5  | mg/L  | 2.540               | 0.879 | 0.829 | 9.634  | 1.500 | 3.900  | 0.885                       | 0.346 | -0.017 | 9.155  |
| St             | 3 | 3  | mg/L  | 0.080               | 0.044 | 1.630 | 0.000  | 0.050 | 0.130  | -2.616                      | 0.507 | 1.484  | 0.000  |
| Na             | 5 | 5  | mg/L  | 6.300               | 2.706 | 1.894 | 12.049 | 4.000 | 11.000 | 1.780                       | 0.372 | 1.408  | 11.093 |
| Hg             | 1 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| As             | 1 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Se             | 1 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000  | 0.000 | 0.000  | 0.000                       | 0.000 | 0.000  | 0.000  |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans         | Mean  | Tstd                 | Trans | Mean  | Tstd  |
| Ba             | 3 | 3  | mg/L  | 0.010 | 0.015                        | 0.015    | 0.015 | LN            | 0.015 | 0.121                | LN    | 0.015 | 0.348 |
| K              | 5 | 5  | mg/L  | 0.050 | 2.540                        | 2.540    | 2.540 | LN            | 2.570 | 0.119                | LN    | 2.570 | 0.346 |
| St             | 3 | 3  | mg/L  | 0.010 | 0.080                        | 0.080    | 0.080 | LN            | 0.083 | 0.257                | LN    | 0.083 | 0.507 |
| Na             | 5 | 5  | mg/L  | 0.500 | 6.300                        | 6.300    | 6.300 | LN            | 6.350 | 0.138                | LN    | 6.350 | 0.372 |
| Hg             | 1 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| As             | 1 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| Se             | 1 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       | Weighted Ave. with Cu values |          |         | MLE Estimates |         | Regression Estimates |       |         |       |
|----------------|---|----|-------|------------------------|-------|------------------------------|----------|---------|---------------|---------|----------------------|-------|---------|-------|
|                |   |    |       | Mean                   | Tstd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans         | Mean    | X                    | Trans | Mean    | X     |
| Ba             | 0 | 0  | g/d   | 0.000                  | 0.000 | 876.000                      | 876.000  | 876.000 | LN            | 876.000 | 0.581                | LN    | 876.000 | 0.610 |
| K              | 0 | 0  | kg/d  | 0.000                  | 0.000 | 148.000                      | 148.000  | 148.000 | LN            | 150.000 | 0.579                | LN    | 150.000 | 0.597 |
| St             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 4.670                        | 4.670    | 4.670   | LN            | 4.850   | 0.595                | LN    | 4.850   | 0.646 |
| Na             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 368.000                      | 368.000  | 368.000 | LN            | 371.000 | 0.580                | LN    | 371.000 | 0.600 |
| Hg             | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| As             | 0 | 0  | g/d   | 0.000                  | 0.000 | 5.840                        | 2.920    | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |
| Se             | 0 | 0  | g/d   | 0.000                  | 0.000 | 5.840                        | 2.920    | 0.000   | N/A           | 0.000   | 0.000                | N/A   | 0.000   | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |            |          | Units | Loading Estimates |            |          |
|----------------|-------|-------------------------|------------|----------|-------|-------------------|------------|----------|
|                |       | Mean                    | Confidence | Interval |       | Mean              | Confidence | Interval |
| Ba             | mg/L  | 0.015                   | 0.013      | 0.017    | g/d   | 876.00            | 281.00     | 2730.00  |
| K              | mg/L  | 2.570                   | 2.310      | 2.850    | kg/d  | 150.00            | 48.20      | 466.00   |
| St             | mg/L  | 0.083                   | 0.062      | 0.110    | kg/d  | 4.85              | 1.51       | 15.60    |
| Na             | mg/L  | 6.350                   | 5.620      | 7.170    | kg/d  | 371.00            | 119.00     | 1160.00  |
| Hg             | ug/L  | NC                      |            |          | mg/d  | NC                |            |          |
| As             | ug/L  | NC                      |            |          | g/d   | NC                |            |          |
| Se             | ug/L  | NC                      |            |          | g/d   | NC                |            |          |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 1: Concentration file: algo5.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-2

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Mean  | Raw data statistics |        |        |       | Range |  | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|-------|---------------------|--------|--------|-------|-------|--|-----------------------------|-------|--------|--------|
|                |   |    |       |       | Std                 | Skew   | Kurt   | Min   | Max   |  | Mean                        | Std   | Skew   | Kurt   |
| Ba             | 3 | 3  | mg/L  | 0.017 | 0.006               | -1.732 | 0.000  | 0.010 | 0.020 |  | -4.143                      | 0.400 | -1.732 | 0.000  |
| K              | 5 | 5  | mg/L  | 0.850 | 0.398               | 2.040  | 12.306 | 0.600 | 1.550 |  | -0.232                      | 0.391 | 1.794  | 11.450 |
| St             | 3 | 3  | mg/L  | 0.050 | 0.017               | 1.732  | 0.000  | 0.040 | 0.070 |  | -3.032                      | 0.323 | 1.732  | 0.000  |
| Na             | 5 | 5  | mg/L  | 4.800 | 2.387               | 2.043  | 12.423 | 3.000 | 9.000 |  | 1.491                       | 0.414 | 1.694  | 11.611 |
| Hg             | 0 | 0  | ug/L  | 0.000 | 0.000               | 0.000  | 0.000  | 0.000 | 0.000 |  | 0.000                       | 0.000 | 0.000  | 0.000  |
| As             | 0 | 0  | ug/L  | 0.000 | 0.000               | 0.000  | 0.000  | 0.000 | 0.000 |  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Se             | 0 | 0  | ug/L  | 0.000 | 0.000               | 0.000  | 0.000  | 0.000 | 0.000 |  | 0.000                       | 0.000 | 0.000  | 0.000  |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| Ba             | 3 | 3  | mg/L  | 0.010 | 0.017                        | 0.017    | 0.017 | LN    | 0.017         | 0.160 | LN                   | 0.017 | 0.400 | 0.750 |
| K              | 5 | 5  | mg/L  | 0.050 | 0.850                        | 0.850    | 0.850 | LN    | 0.860         | 0.153 | LN                   | 0.860 | 0.391 | 0.737 |
| St             | 3 | 3  | mg/L  | 0.010 | 0.050                        | 0.050    | 0.050 | LN    | 0.051         | 0.104 | LN                   | 0.051 | 0.323 | 0.750 |
| Na             | 5 | 5  | mg/L  | 0.500 | 4.800                        | 4.800    | 4.800 | LN    | 4.840         | 0.171 | LN                   | 4.840 | 0.414 | 0.704 |
| Hg             | 0 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| As             | 0 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| Se             | 0 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       | Weighted Ave. with Cu values |          |         |       | MLE Estimates |       | Regression Estimates |         |       |
|----------------|---|----|-------|------------------------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|---------|-------|
|                |   |    |       | Mean                   | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans | Mean          | X     | Trans                | Mean    | X     |
| Ba             | 0 | 0  | g/d   | 0.000                  | 0.000 | 993.000                      | 993.000  | 993.000 | LN    | 993.000       | 0.584 | LN                   | 993.000 | 0.621 |
| K              | 0 | 0  | kg/d  | 0.000                  | 0.000 | 49.600                       | 49.600   | 49.600  | LN    | 50.200        | 0.580 | LN                   | 50.200  | 0.602 |
| St             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 2.920                        | 2.920    | 2.920   | LN    | 2.980         | 0.579 | LN                   | 2.980   | 0.606 |
| Na             | 0 | 0  | kg/d  | 0.000                  | 0.000 | 280.000                      | 280.000  | 280.000 | LN    | 283.000       | 0.581 | LN                   | 283.000 | 0.605 |
| Hg             | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |
| As             | 0 | 0  | g/d   | 0.000                  | 0.000 | 5.840                        | 2.920    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |
| Se             | 0 | 0  | g/d   | 0.000                  | 0.000 | 5.840                        | 2.920    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000   | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     |       | Units | Loading Estimates |                     |         |
|----------------|-------|-------------------------|---------------------|-------|-------|-------------------|---------------------|---------|
|                |       | Mean                    | Confidence Interval |       |       | Mean              | Confidence Interval |         |
| Ba             | mg/L  | 0.017                   | 0.014               | 0.020 | g/d   | 993.00            | 316.00              | 3120.00 |
| K              | mg/L  | 0.860                   | 0.750               | 0.980 | kg/d  | 50.20             | 16.10               | 157.00  |
| St             | mg/L  | 0.051                   | 0.045               | 0.057 | kg/d  | 2.98              | 0.96                | 9.28    |
| Na             | mg/L  | 4.840                   | 4.160               | 5.620 | kg/d  | 283.00            | 90.60               | 884.00  |
| Hg             | ug/L  | 0.005#                  |                     |       | mg/d  | 292.00#           |                     |         |
| As             | ug/L  | 0.050#                  |                     |       | g/d   | 2.92#             |                     |         |
| Se             | ug/L  | 0.050#                  |                     |       | g/d   | 2.92#             |                     |         |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 3: Concentration file: algo5.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-3

Number: 1

Mean flow (QBAR): 26300000. L/d Std: 20400000. Skew: 1.32 Kurt: 4.71 Flow points: 12 (LogStd or TStd: 0.795)

| Statistical Analysis of Detected Concentrations |                     |    |       |       |       |                             |        |       |       |        |       |       |        |
|-------------------------------------------------|---------------------|----|-------|-------|-------|-----------------------------|--------|-------|-------|--------|-------|-------|--------|
| Parameter Code                                  | Raw data statistics |    |       | Range |       | Log(e) Transform Statistics |        |       |       |        |       |       |        |
|                                                 | N                   | ND | Units | Mean  | Std   | Skew                        | Kurt   | Min   | Max   | Mean   | Std   | Skew  | Kurt   |
| Ba                                              | 2                   | 2  | mg/L  | 0.020 | 0.000 | 0.000                       | 0.000  | 0.020 | 0.020 | -3.912 | 0.000 | 0.000 | 0.000  |
| K                                               | 4                   | 4  | mg/L  | 1.450 | 0.836 | 1.966                       | 17.392 | 0.950 | 2.700 | 0.272  | 0.485 | 1.903 | 17.203 |
| St                                              | 2                   | 2  | mg/L  | 0.055 | 0.000 | 0.000                       | 0.000  | 0.050 | 0.060 | -2.905 | 0.000 | 0.000 | 0.000  |
| Na                                              | 4                   | 4  | mg/L  | 5.500 | 0.707 | 1.414                       | 15.000 | 5.000 | 6.500 | 1.699  | 0.124 | 1.317 | 14.537 |
| Hg                                              | 0                   | 0  | ug/L  | 0.000 | 0.000 | 0.000                       | 0.000  | 0.000 | 0.000 | 0.000  | 0.000 | 0.000 | 0.000  |
| As                                              | 0                   | 0  | ug/L  | 0.000 | 0.000 | 0.000                       | 0.000  | 0.000 | 0.000 | 0.000  | 0.000 | 0.000 | 0.000  |
| Se                                              | 0                   | 0  | ug/L  | 0.000 | 0.000 | 0.000                       | 0.000  | 0.000 | 0.000 | 0.000  | 0.000 | 0.000 | 0.000  |

| Mean Concentration Estimates (CBAR) |                              |    |       |               |       |                      |       |       |       |       |       |       |       |       |
|-------------------------------------|------------------------------|----|-------|---------------|-------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Parameter Code                      | Weighted Ave. with Cu values |    |       | MLE Estimates |       | Regression Estimates |       |       |       |       |       |       |       |       |
|                                     | N                            | ND | Units | DL            | Cu=DL | Cu=0.5DL             | Cu=0  | Trans | Mean  | TStd  | Trans | Mean  | TStd  | R**2  |
| Ba                                  | 2                            | 2  | mg/L  | 0.010         | 0.020 | 0.020                | 0.020 | N/A   | 0.000 | 0.000 | N/A   | 0.000 | 0.000 | 0.000 |
| K                                   | 4                            | 4  | mg/L  | 0.050         | 1.450 | 1.450                | 1.450 | LN    | 1.480 | 0.235 | LN    | 1.480 | 0.485 | 0.716 |
| St                                  | 2                            | 2  | mg/L  | 0.010         | 0.055 | 0.055                | 0.055 | N/A   | 0.000 | 0.000 | N/A   | 0.000 | 0.000 | 0.000 |
| Na                                  | 4                            | 4  | mg/L  | 0.500         | 5.500 | 5.500                | 5.500 | LN    | 5.510 | 0.015 | LN    | 5.510 | 0.124 | 0.848 |

| Loading Estimates: Load=QBAR*CBAR |                        |    |       |                              |       |               |          |                      |       |         |       |       |         |       |
|-----------------------------------|------------------------|----|-------|------------------------------|-------|---------------|----------|----------------------|-------|---------|-------|-------|---------|-------|
| Parameter Code                    | Instantaneous Loadings |    |       | Weighted Ave. with Cu values |       | MLE Estimates |          | Regression Estimates |       |         |       |       |         |       |
|                                   | N                      | ND | Units | Mean                         | TStd  | Cu=DL         | Cu=0.5DL | Cu=0                 | Trans | Mean    | X     | Trans | Mean    | X     |
| Ba                                | 0                      | 0  | g/d   | 0.000                        | 0.000 | 526.000       | 526.000  | 526.000              | N/A   | 0.000   | 0.000 | N/A   | 0.000   | 0.000 |
| K                                 | 0                      | 0  | kg/d  | 0.000                        | 0.000 | 38.100        | 38.100   | 38.100               | LN    | 38.900  | 0.258 | LN    | 38.900  | 0.334 |
| St                                | 0                      | 0  | kg/d  | 0.000                        | 0.000 | 1.450         | 1.450    | 1.450                | N/A   | 0.000   | 0.000 | N/A   | 0.000   | 0.000 |
| Na                                | 0                      | 0  | kg/d  | 0.000                        | 0.000 | 145.000       | 145.000  | 145.000              | LN    | 145.000 | 0.229 | LN    | 145.000 | 0.238 |

| Summary of Mean Concentration and Total Loading Estimates |       |                         |                     |       |                   |                     |       |           |                     |
|-----------------------------------------------------------|-------|-------------------------|---------------------|-------|-------------------|---------------------|-------|-----------|---------------------|
| Parameter Code                                            | Units | Concentration Estimates |                     | Units | Loading Estimates |                     | Units | Estimates |                     |
|                                                           |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |       | Mean      | Confidence Interval |
| Ba                                                        | mg/L  | 0.020#                  |                     | g/d   | 526.00#           |                     |       |           |                     |
| K                                                         | mg/L  | 1.480                   | 1.180 1.860         | kg/d  | 38.90             | 23.50 64.50         |       |           |                     |
| St                                                        | mg/L  | 0.055#                  |                     | kg/d  | 1.45#             |                     |       |           |                     |
| Na                                                        | mg/L  | 5.510                   | 5.430 5.590         | kg/d  | 145.00            | 92.50 227.00        |       |           |                     |
| Hg                                                        | ug/L  | NC                      |                     | ug/d  | NC                |                     |       |           |                     |
| As                                                        | ug/L  | NC                      |                     | ug/d  | NC                |                     |       |           |                     |
| Se                                                        | ug/L  | NC                      |                     | ug/d  | NC                |                     |       |           |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 4: Concentration file: algo5.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-4

Number: 1

Mean flow (QBAR): 88600. L/d Std: 105000. Skew: 1.42 Kurt: 6.51 Flow points: 8 (LogStd or TStd: 1.730)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Mean   | Raw data statistics |        |        |        | Range   |  | Log(e) Transform Statistics |       |        |        |
|----------------|---|----|-------|--------|---------------------|--------|--------|--------|---------|--|-----------------------------|-------|--------|--------|
|                |   |    |       |        | Std                 | Skew   | Kurt   | Min    | Max     |  | Mean                        | Std   | Skew   | Kurt   |
| Ba             | 2 | 2  | mg/L  | 0.155  | 0.000               | 0.000  | 0.000  | 0.150  | 0.160   |  | -1.865                      | 0.000 | 0.000  | 0.000  |
| K              | 4 | 4  | mg/L  | 36.500 | 5.066               | 1.846  | 16.992 | 33.000 | 44.000  |  | 3.591                       | 0.131 | 1.801  | 16.852 |
| St             | 2 | 2  | mg/L  | 2.005  | 0.000               | 0.000  | 0.000  | 1.910  | 2.100   |  | 0.695                       | 0.000 | 0.000  | 0.000  |
| Na             | 4 | 4  | mg/L  | 83.250 | 20.123              | -0.432 | 12.948 | 58.000 | 105.000 |  | 4.398                       | 0.256 | -0.795 | 13.623 |
| Hg             | 0 | 0  | ug/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000  | 0.000   |  | 0.000                       | 0.000 | 0.000  | 0.000  |
| As             | 0 | 0  | ug/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000  | 0.000   |  | 0.000                       | 0.000 | 0.000  | 0.000  |
| Se             | 0 | 0  | ug/L  | 0.000  | 0.000               | 0.000  | 0.000  | 0.000  | 0.000   |  | 0.000                       | 0.000 | 0.000  | 0.000  |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |        |       | MLE Estimates |       | Regression Estimates |        |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|--------|-------|---------------|-------|----------------------|--------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans | Mean          | TStd  | Trans                | Mean   | TStd  | R**2  |
| Ba             | 2 | 2  | mg/L  | 0.010 | 0.150                        | 0.150    | 0.150  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| K              | 4 | 4  | mg/L  | 0.050 | 36.500                       | 36.500   | 36.500 | LN    | 36.600        | 0.017 | LN                   | 36.600 | 0.131 | 0.770 |
| St             | 2 | 2  | mg/L  | 0.010 | 2.000                        | 2.000    | 2.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000  | 0.000 | 0.000 |
| Na             | 4 | 4  | mg/L  | 0.500 | 83.300                       | 83.300   | 83.300 | LN    | 84.000        | 0.065 | LN                   | 84.000 | 0.256 | 0.963 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Mean  | TStd  | Weighted Ave. with Cu values |          |         |       | MLE Estimates |       | Regression Estimates |       |       |
|----------------|---|----|-------|-------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|-------|-------|
|                |   |    |       |       |       | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans | Mean          | X     | Trans                | Mean  | X     |
| Ba             | 0 | 0  | g/d   | 0.000 | 0.000 | 13.300                       | 13.300   | 13.300  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| K              | 0 | 0  | kg/d  | 0.000 | 0.000 | 3.230                        | 3.230    | 3.230   | LN    | 3.240         | 0.612 | LN                   | 3.240 | 0.615 |
| St             | 0 | 0  | g/d   | 0.000 | 0.000 | 177.000                      | 177.000  | 177.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| Na             | 0 | 0  | kg/d  | 0.000 | 0.000 | 7.380                        | 7.380    | 7.380   | LN    | 7.440         | 0.613 | LN                   | 7.440 | 0.625 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     | Units | Loading Estimates |                     |
|----------------|-------|-------------------------|---------------------|-------|-------------------|---------------------|
|                |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |
| Ba             | mg/L  | 0.150#                  |                     | g/d   | 13.30#            |                     |
| K              | mg/L  | 36.600                  | 36.000 37.200       | kg/d  | 3.24              | 0.98 10.70          |
| St             | mg/L  | 2.000#                  |                     | g/d   | 177.00#           |                     |
| Na             | mg/L  | 84.000                  | 78.800 89.600       | kg/d  | 7.44              | 2.24 24.70          |
| Hg             | ug/L  | NC                      |                     | ug/d  | NC                |                     |
| As             | ug/L  | NC                      |                     | ug/d  | NC                |                     |
| Se             | ug/L  | NC                      |                     | ug/d  | NC                |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

## SUMMARY OUTPUT FROM LOADS V2.5 July 1990

Run 5: Concentration file: algo5.dat  
 Analysis for outfall(s): Algoma SW-5  
 Mean flow (QBAR): 339000. L/d Std:

Discharge file: algo.flo  
 Number: 1

144000. Skew: -1.33 Kurt: 10.23 Flow points: 5 (LogStd or TStd: 0.614)

| Statistical Analysis of Detected Concentrations |   |    |       |                     |        |        |       |                |                             |       |        |       |  |
|-------------------------------------------------|---|----|-------|---------------------|--------|--------|-------|----------------|-----------------------------|-------|--------|-------|--|
|                                                 |   |    |       | Raw data statistics |        |        |       |                | Log(e) Transform Statistics |       |        |       |  |
| Parameter Code                                  | N | ND | Units | Mean                | Std    | Skew   | Kurt  | Range          | Mean                        | Std   | Skew   | Kurt  |  |
| Ba                                              | 3 | 3  | mg/L  | 0.160               | 0.046  | 0.935  | 0.000 | 0.120 0.210    | -1.859                      | 0.282 | 0.593  | 0.000 |  |
| K                                               | 5 | 5  | mg/L  | 106.600             | 15.093 | -0.632 | 9.080 | 84.000 125.000 | 4.661                       | 0.148 | -0.934 | 9.468 |  |
| St                                              | 3 | 3  | mg/L  | 3.333               | 0.416  | 1.293  | 0.000 | 3.000 3.800    | 1.199                       | 0.122 | 1.204  | 0.000 |  |
| Na                                              | 5 | 5  | mg/L  | 54.000              | 7.483  | 0.650  | 7.757 | 47.000 65.000  | 3.981                       | 0.136 | 0.453  | 7.187 |  |
| Hg                                              | 0 | 0  | ug/L  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000 0.000    | 0.000                       | 0.000 | 0.000  | 0.000 |  |
| As                                              | 0 | 0  | ug/L  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000 0.000    | 0.000                       | 0.000 | 0.000  | 0.000 |  |
| Se                                              | 0 | 0  | ug/L  | 0.000               | 0.000  | 0.000  | 0.000 | 0.000 0.000    | 0.000                       | 0.000 | 0.000  | 0.000 |  |

| Mean Concentration Estimates (CBAR) |   |    |       |                              |         |          |         |       |               |       |       |         |       |
|-------------------------------------|---|----|-------|------------------------------|---------|----------|---------|-------|---------------|-------|-------|---------|-------|
|                                     |   |    |       | Weighted Ave. with Cu values |         |          |         |       | MLE Estimates |       |       |         |       |
| Parameter Code                      | N | ND | Units | DL                           | Cu=DL   | Cu=0.5DL | Cu=0    | Trans | Mean          | TStd  | Trans | Mean    | TStd  |
| Ba                                  | 3 | 3  | mg/L  | 0.010                        | 0.160   | 0.160    | 0.160   | LN    | 0.160         | 0.079 | LN    | 0.160   | 0.282 |
| K                                   | 5 | 5  | mg/L  | 0.050                        | 107.000 | 107.000  | 107.000 | LN    | 107.000       | 0.022 | LN    | 107.000 | 0.148 |
| St                                  | 3 | 3  | mg/L  | 0.010                        | 3.330   | 3.330    | 3.330   | LN    | 3.340         | 0.015 | LN    | 3.340   | 0.122 |
| Na                                  | 5 | 5  | mg/L  | 0.500                        | 54.000  | 54.000   | 54.000  | LN    | 54.100        | 0.019 | N/A   | 0.000   | 0.000 |

| Loading Estimates: Load=QBAR*CBAR |   |    |       |                        |       |        |          |        |                      |        |       |       |        |
|-----------------------------------|---|----|-------|------------------------|-------|--------|----------|--------|----------------------|--------|-------|-------|--------|
|                                   |   |    |       | Instantaneous Loadings |       |        |          |        | Regression Estimates |        |       |       |        |
| Parameter Code                    | N | ND | Units | Mean                   | TStd  | Cu=DL  | Cu=0.5DL | Cu=0   | Trans                | Mean   | X     | Trans | Mean   |
| Ba                                | 0 | 0  | g/d   | 0.000                  | 0.000 | 54.200 | 54.200   | 54.200 | LN                   | 54.200 | 0.278 | LN    | 54.200 |
| K                                 | 0 | 0  | kg/d  | 0.000                  | 0.000 | 36.300 | 36.300   | 36.300 | LN                   | 36.300 | 0.275 | LN    | 36.300 |
| St                                | 0 | 0  | kg/d  | 0.000                  | 0.000 | 1.130  | 1.130    | 1.130  | LN                   | 1.130  | 0.275 | LN    | 1.130  |
| Na                                | 0 | 0  | kg/d  | 0.000                  | 0.000 | 18.300 | 18.300   | 18.300 | LN                   | 18.300 | 0.275 | N/A   | 0.000  |

| Summary of Mean Concentration and Total Loading Estimates |       |         |  |                         |          |       |       |                   |          |  |  |  |  |
|-----------------------------------------------------------|-------|---------|--|-------------------------|----------|-------|-------|-------------------|----------|--|--|--|--|
|                                                           |       |         |  | Concentration Estimates |          |       |       | Loading Estimates |          |  |  |  |  |
| Parameter Code                                            | Units | Mean    |  | Confidence              | Interval | Units | Mean  | Confidence        | Interval |  |  |  |  |
| Ba                                                        | mg/L  | 0.160   |  | 0.150                   | 0.180    | g/d   | 54.20 | 31.40             | 93.60    |  |  |  |  |
| K                                                         | mg/L  | 107.000 |  | 105.000                 | 109.000  | kg/d  | 36.30 | 21.20             | 62.20    |  |  |  |  |
| St                                                        | mg/L  | 3.340   |  | 3.280                   | 3.400    | kg/d  | 1.13  | 0.66              | 1.94     |  |  |  |  |
| Na                                                        | mg/L  | 54.100  |  | 53.200                  | 55.000   | kg/d  | 18.30 | 10.70             | 31.40    |  |  |  |  |
| Hg                                                        | ug/L  | NC      |  |                         |          | ug/d  | NC    |                   |          |  |  |  |  |
| As                                                        | ug/L  | NC      |  |                         |          | ug/d  | NC    |                   |          |  |  |  |  |
| Se                                                        | ug/L  | NC      |  |                         |          | ug/d  | NC    |                   |          |  |  |  |  |

NOTE: \* Regression estimate used, # Weighted Ave. method used with Cu=0.5DL

# POLYAROMATIC HYDROCARBON SYMBOLS

| <u>Code Name</u> | <u>Name of Compound</u>    |
|------------------|----------------------------|
| PNNAPH           | Naphthalene                |
| PNACNY           | Acenaphthalene             |
| PNACNY           | Acenaphthen                |
| PNFLUO           | Fluorene                   |
| PNPHEN           | Phenanthrene               |
| PNANTH           | Anthracene                 |
| PNFLAN           | Fluoranthene               |
| PNPYR            | Pyrene                     |
| PNBAA            | Benzo(a)anthracene         |
| PNCHRY           | Chrysene                   |
| PNBBFA           | Benzo(b)fluoranthene       |
| PNBKF            | Benzo(k)fluoranthene       |
| PNBAP            | Benzo(a)pyrene             |
| PNPERY           | Perylene                   |
| PNINP            | Indelol (1,2,3-c,d) pyrene |
| PNDAHA           | Dibenzo(a,h)anthracene     |
| PNGHIP           | Benzo(g,h,i)perylene       |
| THAP             | Total PAHs                 |

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 1: Concentration file: algo6.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-1

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |       |       | Range |       | Log(e) Transform Statistics |       |       |       |
|----------------|---|----|-------|---------------------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|
|                |   |    |       | Mean                | Std   | Skew  | Kurt  | Min   | Max   | Mean                        | Std   | Skew  | Kurt  |
| PNNAPH         | 3 | 2  | ug/L  | 0.060               | 0.000 | 0.000 | 0.000 | 0.020 | 0.100 | -3.107                      | 0.000 | 0.000 | 0.000 |
| PNACNY         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNACNY         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNFLUO         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPHEN         | 3 | 1  | ug/L  | 0.050               | 0.000 | 0.000 | 0.000 | 0.050 | 0.050 | -2.996                      | 0.000 | 0.000 | 0.000 |
| PNANTH         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNFLAN         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPYR          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBAA          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNNAPH         | 3 | 2  | ug/L  | 0.100 | 0.073                        | 0.057    | 0.040 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNACNY         | 3 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNACNY         | 3 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNFLUO         | 3 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPHEN         | 3 | 1  | ug/L  | 0.100 | 0.083                        | 0.050    | 0.017 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNANTH         | 3 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNFLAN         | 3 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPYR          | 3 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAA          | 3 | 0  | ug/L  | 0.020 | 0.020                        | 0.010    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | N | ND | Units | Instantaneous Loadings |       | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |
|----------------|---|----|-------|------------------------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|
|                |   |    |       | Mean                   | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | X     | Trans                | Mean  | X     |
| PNNAPH         | 0 | 0  | g/d   | 0.000                  | 0.000 | 4.260                        | 3.330    | 2.340 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNACNY         | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNACNY         | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNFLUO         | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNPHEN         | 0 | 0  | g/d   | 0.000                  | 0.000 | 4.850                        | 2.920    | 0.990 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNANTH         | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNFLAN         | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNPYR          | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000                      | 292.000  | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBAA          | 0 | 0  | g/d   | 0.000                  | 0.000 | 1.170                        | 0.580    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     | Units | Loading Estimates |                     |
|----------------|-------|-------------------------|---------------------|-------|-------------------|---------------------|
|                |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |
| PNNAPH         | ug/L  | 0.057#                  |                     | g/d   | 3.33#             |                     |
| PNACNY         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNACNY         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNFLUO         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNPHEN         | ug/L  | 0.050#                  |                     | g/d   | 2.92#             |                     |
| PNANTH         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNFLAN         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNPYR          | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNBAA          | ug/L  | NC                      |                     | g/d   | NC                |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 2: Concentration file: algo6.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-2

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

| Statistical Analysis of Detected Concentrations |   |    |       |                     |       |       |       |       |       |                             |       |       |       |
|-------------------------------------------------|---|----|-------|---------------------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|
| Parameter                                       |   |    |       | Raw data statistics |       |       |       | Range |       | Log(e) Transform Statistics |       |       |       |
| Code                                            | N | ND | Units | Mean                | Std   | Skew  | Kurt  | Min   | Max   | Mean                        | Std   | Skew  | Kurt  |
| PNNAPH                                          | 3 | 2  | ug/L  | 0.020               | 0.000 | 0.000 | 0.000 | 0.010 | 0.030 | -4.056                      | 0.000 | 0.000 | 0.000 |
| PNACNY                                          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNACNY                                          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNFLUO                                          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPHEN                                          | 3 | 1  | ug/L  | 0.030               | 0.000 | 0.000 | 0.000 | 0.030 | 0.030 | -3.507                      | 0.000 | 0.000 | 0.000 |
| PNANTH                                          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNFLAN                                          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPYR                                           | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBAA                                           | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |

| Mean Concentration Estimates (CBAR) |   |    |       |                              |       |          |            |               |       |                      |       |       |       |
|-------------------------------------|---|----|-------|------------------------------|-------|----------|------------|---------------|-------|----------------------|-------|-------|-------|
| Parameter                           |   |    |       | Weighted Ave. with Cu values |       |          |            | MLE Estimates |       | Regression Estimates |       |       |       |
| Code                                | N | ND | Units | DL                           | Cu=DL | Cu=0.5DL | Cu=0 Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNNAPH                              | 3 | 2  | ug/L  | 0.100                        | 0.047 | 0.030    | 0.013 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNACNY                              | 3 | 0  | ug/L  | 0.010                        | 0.010 | 0.005    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNACNY                              | 3 | 0  | ug/L  | 0.010                        | 0.010 | 0.005    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNFLUO                              | 3 | 0  | ug/L  | 0.010                        | 0.010 | 0.005    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPHEN                              | 3 | 1  | ug/L  | 0.100                        | 0.077 | 0.043    | 0.010 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNANTH                              | 3 | 0  | ug/L  | 0.010                        | 0.010 | 0.005    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNFLAN                              | 3 | 0  | ug/L  | 0.010                        | 0.010 | 0.005    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPYR                               | 3 | 0  | ug/L  | 0.010                        | 0.010 | 0.005    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAA                               | 3 | 0  | ug/L  | 0.020                        | 0.020 | 0.010    | 0.000 N/A  | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

| Loading Estimates: Load=QBAR*CBAR |   |    |       |                        |       |         |          |                              |       |               |       |                      |       |
|-----------------------------------|---|----|-------|------------------------|-------|---------|----------|------------------------------|-------|---------------|-------|----------------------|-------|
| Parameter                         |   |    |       | Instantaneous Loadings |       |         |          | Weighted Ave. with Cu values |       | MLE Estimates |       | Regression Estimates |       |
| Code                              | N | ND | Units | Mean                   | TStd  | Cu=DL   | Cu=0.5DL | Cu=0 Trans                   | Mean  | X             | Trans | Mean                 | X     |
| PNNAPH                            | 0 | 0  | g/d   | 0.000                  | 0.000 | 2.740   | 1.750    | 0.760 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNACNY                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNACNY                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNFLUO                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNPHEN                            | 0 | 0  | g/d   | 0.000                  | 0.000 | 4.500   | 2.510    | 0.580 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNANTH                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNFLAN                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNPYR                             | 0 | 0  | mg/d  | 0.000                  | 0.000 | 584.000 | 292.000  | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |
| PNBAA                             | 0 | 0  | g/d   | 0.000                  | 0.000 | 1.170   | 0.580    | 0.000 N/A                    | 0.000 | 0.000         | N/A   | 0.000                | 0.000 |

| Summary of Mean Concentration and Total Loading Estimates |       |        |                     |                         |       |                     |  |                   |      |                     |  |  |  |
|-----------------------------------------------------------|-------|--------|---------------------|-------------------------|-------|---------------------|--|-------------------|------|---------------------|--|--|--|
| Parameter                                                 |       |        |                     | Concentration Estimates |       |                     |  | Loading Estimates |      |                     |  |  |  |
| Code                                                      | Units | Mean   | Confidence Interval | Units                   | Mean  | Confidence Interval |  | Units             | Mean | Confidence Interval |  |  |  |
| PNNAPH                                                    | ug/L  | 0.030# |                     | g/d                     | 1.75# |                     |  | mg/d              | NC   |                     |  |  |  |
| PNACNY                                                    | ug/L  | NC     |                     | mg/d                    | NC    |                     |  | mg/d              | NC   |                     |  |  |  |
| PNACNY                                                    | ug/L  | NC     |                     | mg/d                    | NC    |                     |  | mg/d              | NC   |                     |  |  |  |
| PNFLUO                                                    | ug/L  | NC     |                     | mg/d                    | NC    |                     |  | mg/d              | NC   |                     |  |  |  |
| PNPHEN                                                    | ug/L  | 0.043# |                     | g/d                     | 2.51# |                     |  | mg/d              | NC   |                     |  |  |  |
| PNANTH                                                    | ug/L  | NC     |                     | mg/d                    | NC    |                     |  | mg/d              | NC   |                     |  |  |  |
| PNFLAN                                                    | ug/L  | NC     |                     | mg/d                    | NC    |                     |  | mg/d              | NC   |                     |  |  |  |
| PNPYR                                                     | ug/L  | NC     |                     | mg/d                    | NC    |                     |  | mg/d              | NC   |                     |  |  |  |
| PNBAA                                                     | ug/L  | NC     |                     | g/d                     | NC    |                     |  |                   |      |                     |  |  |  |

NOTE: \* Regression estimate used, # Weighted Ave. method



## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 3: Concentration file: algo6.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-3

Number: 1

Mean flow (QBAR): 26300000. L/d Std: 20400000. Skew: 1.32 Kurt: 4.71 Flow points: 12 (LogStd or TStd: 0.795)

## Statistical Analysis of Detected Concentrations

| Parameter<br>Code | N | ND | Units | Raw data statistics |       |       |       | Range |       | Log(e) Transform Statistics |       |       |       |
|-------------------|---|----|-------|---------------------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|
|                   |   |    |       | Mean                | Std   | Skew  | Kurt  | Min   | Max   | Mean                        | Std   | Skew  | Kurt  |
| PNNAPH            | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNACNY            | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNACNY            | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNFLUO            | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPHEN            | 2 | 1  | ug/L  | 0.200               | 0.000 | 0.000 | 0.000 | 0.200 | 0.200 | -1.609                      | 0.000 | 0.000 | 0.000 |
| PNANTH            | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNFLAN            | 2 | 1  | ug/L  | 0.200               | 0.000 | 0.000 | 0.000 | 0.200 | 0.200 | -1.609                      | 0.000 | 0.000 | 0.000 |
| PNPYR             | 2 | 1  | ug/L  | 0.100               | 0.000 | 0.000 | 0.000 | 0.100 | 0.100 | -2.303                      | 0.000 | 0.000 | 0.000 |
| PNBAA             | 2 | 1  | ug/L  | 0.100               | 0.000 | 0.000 | 0.000 | 0.100 | 0.100 | -2.303                      | 0.000 | 0.000 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter<br>Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|-------------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|                   |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNNAPH            | 2 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNACNY            | 2 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNACNY            | 2 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNFLUO            | 2 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPHEN            | 2 | 1  | ug/L  | 0.100 | 0.150                        | 0.120    | 0.100 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNANTH            | 2 | 0  | ug/L  | 0.010 | 0.010                        | 0.005    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNFLAN            | 2 | 1  | ug/L  | 0.010 | 0.110                        | 0.100    | 0.100 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPYR             | 2 | 1  | ug/L  | 0.010 | 0.055                        | 0.052    | 0.050 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAA             | 2 | 1  | ug/L  | 0.020 | 0.060                        | 0.055    | 0.050 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter | Instantaneous Loadings |    |       |       | Weighted Ave. with Cu values |         |          | MLE Estimates |       |       | Regression Estimates |       |       |       |
|-----------|------------------------|----|-------|-------|------------------------------|---------|----------|---------------|-------|-------|----------------------|-------|-------|-------|
| Code      | N                      | ND | Units | Mean  | TStd                         | Cu=DL   | Cu=0.5DL | Cu=0          | Trans | Mean  | X                    | Trans | Mean  | X     |
| PNNAPH    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.630   | 1.320    | 0.000         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNACNY    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 263.000 | 132.000  | 0.000         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNACNY    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 263.000 | 132.000  | 0.000         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNFLUO    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 263.000 | 132.000  | 0.000         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNPHEN    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 3.950   | 3.160    | 2.630         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNANTH    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 263.000 | 132.000  | 0.000         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNFLAN    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.890   | 2.630    | 2.630         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNPYR     | 0                      | 0  | g/d   | 0.000 | 0.000                        | 1.450   | 1.370    | 1.320         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBAA     | 0                      | 0  | g/d   | 0.000 | 0.000                        | 1.580   | 1.450    | 1.320         | N/A   | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter<br>Code | Units | Concentration Estimates |                     | Units | Loading Estimates |                     |
|-------------------|-------|-------------------------|---------------------|-------|-------------------|---------------------|
|                   |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |
| PNNAPH            | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNACNY            | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNACNY            | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNFLUO            | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNPHEN            | ug/L  | 0.120#                  |                     | g/d   | 3.16#             |                     |
| PNANTH            | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNFLAN            | ug/L  | 0.100#                  |                     | g/d   | 2.63#             |                     |
| PNPYR             | ug/L  | 0.052#                  |                     | g/d   | 1.37#             |                     |
| PNBAA             | ug/L  | 0.055#                  |                     | g/d   | 1.45#             |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 4: Concentration file: algo6.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-4

Number: 1

Mean flow (QBAR): 88600. L/d Std: 105000. Skew: 1.42 Kurt: 6.51 Flow points: 8 (LogStd or TStd: 1.730)

| Statistical Analysis of Detected Concentrations |   |    |       |                     |       |       |       |        |         |                             |       |       |       |
|-------------------------------------------------|---|----|-------|---------------------|-------|-------|-------|--------|---------|-----------------------------|-------|-------|-------|
| Parameter                                       |   |    |       | Raw data statistics |       |       |       | Range  |         | Log(e) Transform Statistics |       |       |       |
| Code                                            | N | ND | Units | Mean                | Std   | Skew  | Kurt  | Min    | Max     | Mean                        | Std   | Skew  | Kurt  |
| PNNAPH                                          | 2 | 2  | ug/L  | 289.000             | 0.000 | 0.000 | 0.000 | 78.000 | 500.000 | 5.286                       | 0.000 | 0.000 | 0.000 |
| PNACNY                                          | 2 | 2  | ug/L  | 11.250              | 0.000 | 0.000 | 0.000 | 5.500  | 17.000  | 2.269                       | 0.000 | 0.000 | 0.000 |
| PNACNY                                          | 2 | 2  | ug/L  | 34.200              | 0.000 | 0.000 | 0.000 | 14.400 | 54.000  | 3.328                       | 0.000 | 0.000 | 0.000 |
| PNFLUO                                          | 2 | 2  | ug/L  | 51.000              | 0.000 | 0.000 | 0.000 | 27.000 | 75.000  | 3.807                       | 0.000 | 0.000 | 0.000 |
| PNPHEN                                          | 2 | 2  | ug/L  | 60.500              | 0.000 | 0.000 | 0.000 | 34.000 | 87.000  | 3.996                       | 0.000 | 0.000 | 0.000 |
| PNANTH                                          | 2 | 2  | ug/L  | 4.150               | 0.000 | 0.000 | 0.000 | 3.200  | 5.100   | 1.396                       | 0.000 | 0.000 | 0.000 |
| PNFLAN                                          | 2 | 2  | ug/L  | 6.000               | 0.000 | 0.000 | 0.000 | 4.900  | 7.100   | 1.775                       | 0.000 | 0.000 | 0.000 |
| PNPYR                                           | 2 | 2  | ug/L  | 3.250               | 0.000 | 0.000 | 0.000 | 2.400  | 4.100   | 1.143                       | 0.000 | 0.000 | 0.000 |
| PNBAA                                           | 2 | 2  | ug/L  | 0.150               | 0.000 | 0.000 | 0.000 | 0.100  | 0.200   | -1.956                      | 0.000 | 0.000 | 0.000 |

| Parameter Code |    |       |      | Mean Concentration Estimates (CBAR) |               |         |         |      |       |       |      | Regression Estimates |       |       |  |
|----------------|----|-------|------|-------------------------------------|---------------|---------|---------|------|-------|-------|------|----------------------|-------|-------|--|
|                |    |       |      | Weighted Ave. with Cu values        | MLE Estimates |         |         |      |       |       |      |                      |       |       |  |
| N              | ND | Units | DL   | Cu=DL                               | Cu=0.5DL      | Cu=0    | Trans   | Mean | TStd  | Trans | Mean | TStd                 | R**2  |       |  |
| PNNAPH         | 2  | 2     | ug/L | 0.100                               | 289.000       | 289.000 | 289.000 | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNACNY         | 2  | 2     | ug/L | 0.010                               | 11.200        | 11.200  | 11.200  | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNACNY         | 2  | 2     | ug/L | 0.010                               | 34.200        | 34.200  | 34.200  | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNFLUO         | 2  | 2     | ug/L | 0.010                               | 51.000        | 51.000  | 51.000  | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNPHEN         | 2  | 2     | ug/L | 0.100                               | 60.500        | 60.500  | 60.500  | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNANTH         | 2  | 2     | ug/L | 0.010                               | 4.150         | 4.150   | 4.150   | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNFLAN         | 2  | 2     | ug/L | 0.010                               | 6.000         | 6.000   | 6.000   | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNPYR          | 2  | 2     | ug/L | 0.010                               | 3.250         | 3.250   | 3.250   | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |
| PNBAA          | 2  | 2     | ug/L | 0.020                               | 0.150         | 0.150   | 0.150   | N/A  | 0.000 | 0.000 | N/A  | 0.000                | 0.000 | 0.000 |  |

| Parameter<br>Code | Instantaneous Loadings |    |       |       |       | Loading Estimates: Load=QBAR*CBAR |                       |                   |       | Regression Estimates  |       |       |       |       |
|-------------------|------------------------|----|-------|-------|-------|-----------------------------------|-----------------------|-------------------|-------|-----------------------|-------|-------|-------|-------|
|                   | N                      | ND | Units | Mean  | TStd  | Weighted<br>Cu=DL                 | Ave. with<br>Cu=0.5DL | Cu values<br>Cu=0 | Trans | MLE Estimates<br>Mean | X     | Trans | Mean  | X     |
|                   |                        |    |       |       |       |                                   |                       |                   |       |                       |       |       |       |       |
| PNNAPH            | 0                      | 0  | g/d   | 0.000 | 0.000 | 25.600                            | 25.600                | 25.600            | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNACNY            | 0                      | 0  | mg/d  | 0.000 | 0.000 | 992.000                           | 992.000               | 992.000           | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNACNY            | 0                      | 0  | g/d   | 0.000 | 0.000 | 3.030                             | 3.030                 | 3.030             | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNFLUO            | 0                      | 0  | g/d   | 0.000 | 0.000 | 4.520                             | 4.520                 | 4.520             | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNPHEN            | 0                      | 0  | g/d   | 0.000 | 0.000 | 5.360                             | 5.360                 | 5.360             | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNANTH            | 0                      | 0  | mg/d  | 0.000 | 0.000 | 368.000                           | 368.000               | 368.000           | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNFLAN            | 0                      | 0  | mg/d  | 0.000 | 0.000 | 532.000                           | 532.000               | 532.000           | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNPYR             | 0                      | 0  | mg/d  | 0.000 | 0.000 | 288.000                           | 288.000               | 288.000           | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |
| PNBAA             | 0                      | 0  | mg/d  | 0.000 | 0.000 | 13.300                            | 13.300                | 13.300            | N/A   | 0.000                 | 0.000 | N/A   | 0.000 | 0.000 |

| Summary of Mean Concentration and Total Loading Estimates |       |          |                     |                         |         |                     |  |                   |         |                     |  |  |  |
|-----------------------------------------------------------|-------|----------|---------------------|-------------------------|---------|---------------------|--|-------------------|---------|---------------------|--|--|--|
| Parameter                                                 |       |          |                     | Concentration Estimates |         |                     |  | Loading Estimates |         |                     |  |  |  |
| Code                                                      | Units | Mean     | Confidence Interval | Units                   | Mean    | Confidence Interval |  | Units             | Mean    | Confidence Interval |  |  |  |
| PNNAPH                                                    | ug/L  | 289.000# |                     | g/d                     | 25.60#  |                     |  | g/d               | 25.60#  |                     |  |  |  |
| PNACNY                                                    | ug/L  | 11.200#  |                     | mg/d                    | 992.00# |                     |  | mg/d              | 992.00# |                     |  |  |  |
| PNACNY                                                    | ug/L  | 34.200#  |                     | g/d                     | 3.03#   |                     |  | g/d               | 3.03#   |                     |  |  |  |
| PNFLUO                                                    | ug/L  | 51.000#  |                     | g/d                     | 4.52#   |                     |  | g/d               | 4.52#   |                     |  |  |  |
| PNPHEN                                                    | ug/L  | 60.500#  |                     | g/d                     | 5.36#   |                     |  | g/d               | 5.36#   |                     |  |  |  |
| PNANTH                                                    | ug/L  | 4.150#   |                     | mg/d                    | 368.00# |                     |  | mg/d              | 368.00# |                     |  |  |  |
| PNFLAN                                                    | ug/L  | 6.000#   |                     | mg/d                    | 532.00# |                     |  | mg/d              | 532.00# |                     |  |  |  |
| PNPYR                                                     | ug/L  | 3.250#   |                     | mg/d                    | 288.00# |                     |  | mg/d              | 288.00# |                     |  |  |  |
| PNBAA                                                     | ug/L  | 0.150#   |                     | mg/d                    | 13.30#  |                     |  | mg/d              | 13.30#  |                     |  |  |  |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 5: Concentration file: algo6.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-5

Number: 1

Mean flow (QBAR): 339000. L/d Std: 144000. Skew: -1.33 Kurt: 10.23 Flow points: 5 (LogStd or TStd: 0.614)

| Statistical Analysis of Detected Concentrations |   |    |       |                     |         |        |       |       |         |                             |       |        |       |
|-------------------------------------------------|---|----|-------|---------------------|---------|--------|-------|-------|---------|-----------------------------|-------|--------|-------|
| Parameter Code                                  | N | ND | Units | Raw data statistics |         |        |       | Range |         | Log(e) Transform Statistics |       |        |       |
|                                                 |   |    |       | Mean                | Std     | Skew   | Kurt  | Min   | Max     | Mean                        | Std   | Skew   | Kurt  |
| PNNAPH                                          | 3 | 3  | ug/L  | 103.700             | 145.197 | 1.607  | 0.000 | 2.100 | 270.000 | 3.335                       | 2.445 | -0.594 | 0.000 |
| PNACNY                                          | 3 | 3  | ug/L  | 0.277               | 0.137   | -0.747 | 0.000 | 0.130 | 0.400   | -1.387                      | 0.584 | -1.271 | 0.000 |
| PNACNY                                          | 3 | 3  | ug/L  | 0.903               | 0.495   | 0.030  | 0.000 | 0.410 | 1.400   | -0.220                      | 0.622 | -0.802 | 0.000 |
| PNFLUO                                          | 3 | 3  | ug/L  | 0.790               | 0.215   | -0.209 | 0.000 | 0.570 | 1.000   | -0.262                      | 0.283 | -0.602 | 0.000 |
| PNPHEN                                          | 3 | 3  | ug/L  | 1.717               | 0.732   | 0.699  | 0.000 | 1.050 | 2.500   | 0.478                       | 0.434 | 0.087  | 0.000 |
| PNANTH                                          | 3 | 2  | ug/L  | 0.225               | 0.000   | 0.000  | 0.000 | 0.150 | 0.300   | -1.551                      | 0.000 | 0.000  | 0.000 |
| PNFLAN                                          | 3 | 3  | ug/L  | 0.717               | 0.176   | 0.423  | 0.000 | 0.550 | 0.900   | -0.353                      | 0.246 | 0.062  | 0.000 |
| PNPYR                                           | 3 | 3  | ug/L  | 0.470               | 0.113   | 1.717  | 0.000 | 0.400 | 0.600   | -0.773                      | 0.227 | 1.709  | 0.000 |
| PNBAA                                           | 3 | 0  | ug/L  | 0.000               | 0.000   | 0.000  | 0.000 | 0.000 | 0.000   | 0.000                       | 0.000 | 0.000  | 0.000 |

| Mean Concentration Estimates (CBAR) |   |    |       |       |                              |          |         |       |               |       |                      |       |       |
|-------------------------------------|---|----|-------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|-------|-------|
| Parameter Code                      | N | ND | Units | DL    | Weighted Ave. with Cu values |          |         | Trans | MLE Estimates |       | Regression Estimates |       |       |
|                                     |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0    |       | Mean          | TStd  | Trans                | Mean  | TStd  |
| PNNAPH                              | 3 | 3  | ug/L  | 0.100 | 104.000                      | 104.000  | 104.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNACNY                              | 3 | 3  | ug/L  | 0.010 | 0.280                        | 0.280    | 0.280   | LN    | 0.300         | 0.341 | LN                   | 0.300 | 0.584 |
| PNACNY                              | 3 | 3  | ug/L  | 0.010 | 0.900                        | 0.900    | 0.900   | LN    | 0.970         | 0.387 | LN                   | 0.970 | 0.622 |
| PNFLUO                              | 3 | 3  | ug/L  | 0.010 | 0.790                        | 0.790    | 0.790   | LN    | 0.800         | 0.080 | LN                   | 0.800 | 0.283 |
| PNPHEN                              | 3 | 3  | ug/L  | 0.100 | 1.720                        | 1.720    | 1.720   | LN    | 1.770         | 0.188 | LN                   | 1.770 | 0.434 |
| PNANTH                              | 3 | 2  | ug/L  | 0.010 | 0.150                        | 0.150    | 0.150   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNFLAN                              | 3 | 3  | ug/L  | 0.010 | 0.720                        | 0.720    | 0.720   | LN    | 0.720         | 0.061 | LN                   | 0.720 | 0.246 |
| PNPYR                               | 3 | 3  | ug/L  | 0.010 | 0.470                        | 0.470    | 0.470   | LN    | 0.470         | 0.052 | LN                   | 0.470 | 0.227 |
| PNBAA                               | 3 | 0  | ug/L  | 0.020 | 0.020                        | 0.010    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |

| Loading Estimates: Load=QBAR*CBAR |   |    |       |                        |       |                              |          |         |               |         |                      |      |         |
|-----------------------------------|---|----|-------|------------------------|-------|------------------------------|----------|---------|---------------|---------|----------------------|------|---------|
| Parameter Code                    | N | ND | Units | Instantaneous Loadings |       | Weighted Ave. with Cu values |          |         | MLE Estimates |         | Regression Estimates |      |         |
|                                   |   |    |       | Mean                   | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0    | Mean          | X       | Trans                | Mean | X       |
| PNNAPH                            | 0 | 0  | g/d   | 0.000                  | 0.000 | 35.300                       | 35.300   | 35.300  | N/A           | 0.000   | 0.000                | N/A  | 0.000   |
| PNACNY                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 94.900                       | 94.900   | 94.900  | LN            | 102.000 | 0.338                | LN   | 102.000 |
| PNACNY                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 305.000                      | 305.000  | 305.000 | LN            | 329.000 | 0.354                | LN   | 329.000 |
| PNFLUO                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 268.000                      | 268.000  | 268.000 | LN            | 271.000 | 0.279                | LN   | 271.000 |
| PNPHEN                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 583.000                      | 583.000  | 583.000 | LN            | 600.000 | 0.295                | LN   | 600.000 |
| PNANTH                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 50.900                       | 50.900   | 50.900  | N/A           | 0.000   | 0.000                | N/A  | 0.000   |
| PNFLAN                            | 0 | 0  | mg/d  | 0.000                  | 0.000 | 244.000                      | 244.000  | 244.000 | LN            | 244.000 | 0.277                | LN   | 244.000 |
| PNPYR                             | 0 | 0  | mg/d  | 0.000                  | 0.000 | 159.000                      | 159.000  | 159.000 | LN            | 159.000 | 0.276                | LN   | 159.000 |
| PNBAA                             | 0 | 0  | mg/d  | 0.000                  | 0.000 | 6.780                        | 3.390    | 0.000   | N/A           | 0.000   | 0.000                | N/A  | 0.000   |

| Parameter Code | Summary of Mean Concentration and Total Loading Estimates |          |                     |       |                   |        |                     |         |
|----------------|-----------------------------------------------------------|----------|---------------------|-------|-------------------|--------|---------------------|---------|
|                | Concentration Estimates                                   |          |                     |       | Loading Estimates |        |                     |         |
|                | Units                                                     | Mean     | Confidence Interval |       | Units             | Mean   | Confidence Interval |         |
| PNNAPH         | ug/L                                                      | 104.000# |                     |       | g/d               | 35.30# | *                   |         |
| PNACNY         | ug/L                                                      | 0.300    | 0.200               | 0.440 | mg/d              | 102.00 | 52.60               | 198.00  |
| PNACNY         | ug/L                                                      | 0.970    | 0.630               | 1.500 | mg/d              | 329.00 | 164.00              | 659.00  |
| PNFLUO         | ug/L                                                      | 0.800    | 0.730               | 0.880 | mg/d              | 271.00 | 157.00              | 468.00  |
| PNPHEN         | ug/L                                                      | 1.770    | 1.430               | 2.190 | mg/d              | 600.00 | 336.00              | 1070.00 |
| PNANTH         | ug/L                                                      | 0.150#   |                     |       | mg/d              | 50.90# |                     |         |
| PNFLAN         | ug/L                                                      | 0.720    | 0.670               | 0.770 | mg/d              | 244.00 | 142.00              | 420.00  |
| PNPYR          | ug/L                                                      | 0.470    | 0.440               | 0.500 | mg/d              | 159.00 | 92.50               | 273.00  |
| PNBAA          | ug/L                                                      | NC       |                     |       | mg/d              | NC     |                     |         |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 1: Concentration file: algo7.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-1

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Statistical Analysis of Detected Concentrations |   |    |       |       |                     |       |       |       |       |        |         |                      |       |       |
|-------------------------------------------------|---|----|-------|-------|---------------------|-------|-------|-------|-------|--------|---------|----------------------|-------|-------|
| Parameter                                       |   |    |       |       | Raw data statistics |       |       |       | Range |        | Log (e) | Transform Statistics |       |       |
| Code                                            | N | ND | Units | Mean  | Std                 | Skew  | Kurt  | Min   | Max   |        | Mean    | Std                  | Skew  | Kurt  |
| PNCHRY                                          | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNBBFA                                          | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNBKF                                           | 2 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNBAP                                           | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNPERY                                          | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNINP                                           | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNDAAH                                          | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| PNGHIP                                          | 3 | 0  | ug/L  | 0.000 | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                | 0.000 | 0.000 |
| TPAH                                            | 2 | 2  | ug/L  | 0.040 | 0.000               | 0.000 | 0.000 | 0.010 | 0.070 | -3.632 | 0.000   | 0.000                | 0.000 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter | Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|-----------|------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|           |      |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNCHRY    | 3    | 0 | 0  | ug/L  | 0.020 | 0.020                        | 0.010    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBBFA    | 3    | 0 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBKF     | 2    | 0 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAP     | 3    | 0 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPERY    | 3    | 0 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNINP     | 3    | 0 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNDAAH    | 3    | 0 | 0  | ug/L  | 0.200 | 0.200                        | 0.100    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNGHIP    | 3    | 0 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| TPAH      | 2    | 2 | 2  | ug/L  | 0.050 | 0.040                        | 0.040    | 0.040 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter | Instantaneous Loadings |    |       |       |       | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |
|-----------|------------------------|----|-------|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|
|           | N                      | ND | Units | Mean  | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | X     | Trans                | Mean  | X     |
| PNCHRY    | 0                      | 0  | g/d   | 0.000 | 0.000 | 1.170                        | 0.580    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBBFA    | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.920                        | 1.460    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBKF     | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.920                        | 1.460    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBAP     | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.920                        | 1.460    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNPERY    | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.920                        | 1.460    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNINP     | 0                      | 0  | g/d   | 0.000 | 0.000 | 5.840                        | 2.920    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNDAAH    | 0                      | 0  | g/d   | 0.000 | 0.000 | 11.700                       | 5.840    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNGHIP    | 0                      | 0  | g/d   | 0.000 | 0.000 | 5.840                        | 2.920    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| TPAH      | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.340                        | 2.340    | 2.340 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter | Code | Units | Concentration Estimates |                     | Units | Loading Estimates |                     |
|-----------|------|-------|-------------------------|---------------------|-------|-------------------|---------------------|
|           |      |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |
| PNCHRY    |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNBBFA    |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNBKF     |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNBAP     |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNPERY    |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNINP     |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNDAAH    |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNGHIP    |      | ug/L  | NC                      |                     | g/d   | NC                |                     |
| TPAH      |      | ug/L  | 0.040#                  |                     | g/d   | 2.34#             |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 2: Concentration file: algo7.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-2

Number: 1

Mean flow (QBAR): 58400000. L/d Std: 92600000. Skew: 1.88 Kurt: 6.52 Flow points: 12 (LogStd or TStd: 1.996)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |       |       | Range |       | Log(e) Transform Statistics |       |       |       |
|----------------|---|----|-------|---------------------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|
|                |   |    |       | Mean                | Std   | Skew  | Kurt  | Min   | Max   | Mean                        | Std   | Skew  | Kurt  |
| PNCHRY         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBBFA         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBKF          | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBAP          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPERY         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNINP          | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNDAAH         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNGHIP         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| TPAH           | 2 | 2  | ug/L  | 0.035               | 0.000 | 0.000 | 0.000 | 0.010 | 0.060 | -3.709                      | 0.000 | 0.000 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNCHRY         | 3 | 0  | ug/L  | 0.020 | 0.020                        | 0.010    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBBFA         | 3 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBKF          | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAP          | 3 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPERY         | 3 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNINP          | 3 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNDAAH         | 3 | 0  | ug/L  | 0.200 | 0.200                        | 0.100    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNGHIP         | 3 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| TPAH           | 2 | 2  | ug/L  | 0.050 | 0.035                        | 0.035    | 0.035 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter | Instantaneous Loadings |    |       |       | Weighted Ave. with Cu values |        |          |       | MLE Estimates |       | Regression Estimates |       |       |       |
|-----------|------------------------|----|-------|-------|------------------------------|--------|----------|-------|---------------|-------|----------------------|-------|-------|-------|
| Code      | N                      | ND | Units | Mean  | TStd                         | Cu=DL  | Cu=0.5DL | Cu=0  | Trans         | Mean  | X                    | Trans | Mean  | X     |
| PNCHRY    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 1.170  | 0.580    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBBFA    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.920  | 1.460    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBKF     | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.920  | 1.460    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBAP     | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.920  | 1.460    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNPERY    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.920  | 1.460    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNINP     | 0                      | 0  | g/d   | 0.000 | 0.000                        | 5.840  | 2.920    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNDAAH    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 11.700 | 5.840    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNGHIP    | 0                      | 0  | g/d   | 0.000 | 0.000                        | 5.840  | 2.920    | 0.000 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| TPAH      | 0                      | 0  | g/d   | 0.000 | 0.000                        | 2.040  | 2.040    | 2.040 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     | Units | Loading Estimates |                     |
|----------------|-------|-------------------------|---------------------|-------|-------------------|---------------------|
|                |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |
| PNCHRY         | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNBBFA         | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNBKF          | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNBAP          | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNPERY         | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNINP          | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNDAAH         | ug/L  | NC                      |                     | g/d   | NC                |                     |
| PNGHIP         | ug/L  | NC                      |                     | g/d   | NC                |                     |
| TPAH           | ug/L  | 0.035#                  |                     | g/d   | 2.04#             |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 1: Concentration file: algo7.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-3

Number: 1

Mean flow (QBAR): 26300000. L/d Std: 20400000. Skew: 1.32 Kurt: 4.71 Flow points: 12 (LogStd or TStd: 0.795)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |       |       | Range |       | Log(e) Transform Statistics |       |       |       |
|----------------|---|----|-------|---------------------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|
|                |   |    |       | Mean                | Std   | Skew  | Kurt  | Min   | Max   | Mean                        | Std   | Skew  | Kurt  |
| PNCHRY         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBBFA         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBKF          | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBAP          | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPERY         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNINP          | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNDAAH         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNGHIP         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000                       | 0.000 | 0.000 | 0.000 |
| TPAH           | 1 | 1  | ug/L  | 0.500               | 0.000 | 0.000 | 0.000 | 0.500 | 0.500 | -0.693                      | 0.000 | 0.000 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |       |        | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|-------|--------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0  | Trans. | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNCHRY         | 2 | 0  | ug/L  | 0.020 | 0.020                        | 0.010    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBBFA         | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBKF          | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAP          | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPERY         | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNINP          | 2 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNDAAH         | 2 | 0  | ug/L  | 0.200 | 0.200                        | 0.100    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNGHIP         | 2 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| TPAH           | 1 | 1  | ug/L  | 0.050 | 0.500                        | 0.500    | 0.500 | N/A    | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter Code | Instantaneous Loadings |    |       |       |       | Weighted Ave. with Cu values |          |        |       | MLE Estimates |       | Regression Estimates |       |       |
|----------------|------------------------|----|-------|-------|-------|------------------------------|----------|--------|-------|---------------|-------|----------------------|-------|-------|
|                | N                      | ND | Units | Mean  | TStd  | Cu=DL                        | Cu=0.5DL | Cu=0   | Trans | Mean          | X     | Trans                | Mean  | X     |
| PNCHRY         | 0                      | 0  | mg/d  | 0.000 | 0.000 | 526.000                      | 263.000  | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBBFA         | 0                      | 0  | g/d   | 0.000 | 0.000 | 1.320                        | 0.660    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBKF          | 0                      | 0  | g/d   | 0.000 | 0.000 | 1.320                        | 0.660    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNBAP          | 0                      | 0  | g/d   | 0.000 | 0.000 | 1.320                        | 0.660    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNPERY         | 0                      | 0  | g/d   | 0.000 | 0.000 | 1.320                        | 0.660    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNINP          | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.630                        | 1.320    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNDAAH         | 0                      | 0  | g/d   | 0.000 | 0.000 | 5.260                        | 2.630    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| PNGHIP         | 0                      | 0  | g/d   | 0.000 | 0.000 | 2.630                        | 1.320    | 0.000  | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |
| TPAH           | 0                      | 0  | g/d   | 0.000 | 0.000 | 13.100                       | 13.100   | 13.100 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Mean   | Concentration Estimates |  | Units | Mean   | Loading Estimates   |  |
|----------------|-------|--------|-------------------------|--|-------|--------|---------------------|--|
|                |       |        | Confidence Interval     |  |       |        | Confidence Interval |  |
| PNCHRY         | ug/L  | NC     |                         |  | mg/d  | NC     |                     |  |
| PNBBFA         | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| PNBKF          | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| PNBAP          | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| PNPERY         | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| PNINP          | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| PNDAAH         | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| PNGHIP         | ug/L  | NC     |                         |  | g/d   | NC     |                     |  |
| TPAH           | ug/L  | 0.500# |                         |  | g/d   | 13.10# |                     |  |

NOTE: \* Regression estimate used, # Weighted Ave. method



## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 5: Concentration file: algo7.dat

Discharge file: algo.flo

Analysis for outfall(s): Algoma SW-4

Number: 1

Mean flow (QBAR): 88600. L/d Std: 105000. Skew: 1.42 Kurt: 6.51 Flow points: 8 (LogStd or TStd: 1.730)

## Statistical Analysis of Detected Concentrations

| Parameter |      |   |    |       | Raw data statistics |       |       |       |  | Range   |         |        |       | Log(e) Transform Statistics |       |  |  |
|-----------|------|---|----|-------|---------------------|-------|-------|-------|--|---------|---------|--------|-------|-----------------------------|-------|--|--|
|           | Code | N | ND | Units | Mean                | Std   | Skew  | Kurt  |  | Min     | Max     | Mean   | Std   | Skew                        | Kurt  |  |  |
| PNCHRY    | 2    | 2 | 2  | ug/L  | 0.100               | 0.000 | 0.000 | 0.000 |  | 0.100   | 0.100   | -2.303 | 0.000 | 0.000                       | 0.000 |  |  |
| PNBBFA    | 2    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| PNBKF     | 1    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| PNBAP     | 2    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| PNPERY    | 2    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| PNINP     | 2    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| PNDHAH    | 2    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| PNGHIP    | 2    | 0 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 |  | 0.000   | 0.000   | 0.000  | 0.000 | 0.000                       | 0.000 |  |  |
| TPAH      | 2    | 2 | 2  | ug/L  | 459.600             | 0.000 | 0.000 | 0.000 |  | 209.200 | 710.000 | 5.954  | 0.000 | 0.000                       | 0.000 |  |  |

## Mean Concentration Estimates (CBAR)

| Parameter |      |   |    |       | Weighted Ave. with Cu values |         |          |         | MLE Estimates |       |       |       | Regression Estimates |       |       |  |
|-----------|------|---|----|-------|------------------------------|---------|----------|---------|---------------|-------|-------|-------|----------------------|-------|-------|--|
|           | Code | N | ND | Units | DL                           | Cu=DL   | Cu=0.5DL | Cu=0    | Trans         | Mean  | TStd  | Trans | Mean                 | TStd  | R**2  |  |
| PNCHRY    | 2    | 2 | 2  | ug/L  | 0.020                        | 0.100   | 0.100    | 0.100   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNBBFA    | 2    | 0 | 0  | ug/L  | 0.050                        | 0.050   | 0.025    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNBKF     | 1    | 0 | 0  | ug/L  | 0.050                        | 0.050   | 0.025    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNBAP     | 2    | 0 | 0  | ug/L  | 0.050                        | 0.050   | 0.025    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNPERY    | 2    | 0 | 0  | ug/L  | 0.050                        | 0.050   | 0.025    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNINP     | 2    | 0 | 0  | ug/L  | 0.100                        | 0.100   | 0.050    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNDHAH    | 2    | 0 | 0  | ug/L  | 0.200                        | 0.200   | 0.100    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| PNGHIP    | 2    | 0 | 0  | ug/L  | 0.100                        | 0.100   | 0.050    | 0.000   | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |
| TPAH      | 2    | 2 | 2  | ug/L  | 0.050                        | 460.000 | 460.000  | 460.000 | N/A           | 0.000 | 0.000 | N/A   | 0.000                | 0.000 | 0.000 |  |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter | Instantaneous Loadings |   |    |       | Weighted Ave. with Cu values |       |        |          | MLE Estimates |       |       |       | Regression Estimates |       |       |  |
|-----------|------------------------|---|----|-------|------------------------------|-------|--------|----------|---------------|-------|-------|-------|----------------------|-------|-------|--|
|           | Code                   | N | ND | Units | Mean                         | TStd  | Cu=DL  | Cu=0.5DL | Cu=0          | Trans | Mean  | X     | Trans                | Mean  | X     |  |
| PNCHRY    | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 8.860  | 8.860    | 8.860         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNBBFA    | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 4.430  | 2.210    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNBKF     | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 4.430  | 2.210    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNBAP     | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 4.430  | 2.210    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNPERY    | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 4.430  | 2.210    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNINP     | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 8.860  | 4.430    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNDHAH    | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 17.700 | 8.860    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| PNGHIP    | 0                      | 0 | 0  | mg/d  | 0.000                        | 0.000 | 8.860  | 4.430    | 0.000         | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |
| TPAH      | 0                      | 0 | 0  | g/d   | 0.000                        | 0.000 | 40.800 | 40.800   | 40.800        | N/A   | 0.000 | 0.000 | N/A                  | 0.000 | 0.000 |  |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter | Concentration Estimates |       |          |                     | Loading Estimates |       |        |                     |
|-----------|-------------------------|-------|----------|---------------------|-------------------|-------|--------|---------------------|
|           | Code                    | Units | Mean     | Confidence Interval | Code              | Units | Mean   | Confidence Interval |
| PNCHRY    |                         | ug/L  | 0.100#   |                     |                   | mg/d  | 8.86#  |                     |
| PNBBFA    |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| PNBKF     |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| PNBAP     |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| PNPERY    |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| PNINP     |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| PNDHAH    |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| PNGHIP    |                         | ug/L  | NC       |                     |                   | mg/d  | NC     |                     |
| TPAH      |                         | ug/L  | 460.000# |                     |                   | g/d   | 40.80# |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method

## SUMMARY OUTPUT FROM LOADS V2.6 Sept. 1990

Run 6: Concentration file: algo7.dat  
 Analysis for outfall(s): Algoma SW-5  
 Mean flow (QBAR): 339000. L/d Std: 144000. Skew: -1.33

Discharge file: algo.flo  
 Number: 1  
 Kurt: 10.23

Flow points: 5 (LogStd or TStd: 0.614)

## Statistical Analysis of Detected Concentrations

| Parameter Code | N | ND | Units | Raw data statistics |       |       |       | Range  |         | Log(e) Transform Statistics |       |       |       |
|----------------|---|----|-------|---------------------|-------|-------|-------|--------|---------|-----------------------------|-------|-------|-------|
|                |   |    |       | Mean                | Std   | Skew  | Kurt  | Min    | Max     | Mean                        | Std   | Skew  | Kurt  |
| PNCHRY         | 3 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBBFA         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBKF          | 1 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNBAP          | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNPERY         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNINP          | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNDHAH         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| PNGHIP         | 2 | 0  | ug/L  | 0.000               | 0.000 | 0.000 | 0.000 | 0.000  | 0.000   | 0.000                       | 0.000 | 0.000 | 0.000 |
| TPAH           | 2 | 2  | ug/L  | 160.400             | 0.000 | 0.000 | 0.000 | 46.100 | 274.700 | 4.723                       | 0.000 | 0.000 | 0.000 |

## Mean Concentration Estimates (CBAR)

| Parameter Code | N | ND | Units | DL    | Weighted Ave. with Cu values |          |         |       | MLE Estimates |       | Regression Estimates |       |       |       |
|----------------|---|----|-------|-------|------------------------------|----------|---------|-------|---------------|-------|----------------------|-------|-------|-------|
|                |   |    |       |       | Cu=DL                        | Cu=0.5DL | Cu=0    | Trans | Mean          | TStd  | Trans                | Mean  | TStd  | R**2  |
| PNCHRY         | 3 | 0  | ug/L  | 0.020 | 0.020                        | 0.010    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBBFA         | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBKF          | 1 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNBAP          | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNPERY         | 2 | 0  | ug/L  | 0.050 | 0.050                        | 0.025    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNINP          | 2 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNDHAH         | 2 | 0  | ug/L  | 0.200 | 0.200                        | 0.100    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| PNGHIP         | 2 | 0  | ug/L  | 0.100 | 0.100                        | 0.050    | 0.000   | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |
| TPAH           | 2 | 2  | ug/L  | 0.050 | 160.000                      | 160.000  | 160.000 | N/A   | 0.000         | 0.000 | N/A                  | 0.000 | 0.000 | 0.000 |

## Loading Estimates: Load=QBAR\*CBAR

| Parameter | Instantaneous Loadings |    |       |       | Weighted Ave. with Cu values |        |          |        | MLE Estimates |       | Regression Estimates |       |       |       |
|-----------|------------------------|----|-------|-------|------------------------------|--------|----------|--------|---------------|-------|----------------------|-------|-------|-------|
| Code      | N                      | ND | Units | Mean  | TStd                         | Cu=DL  | Cu=0.5DL | Cu=0   | Trans         | Mean  | X                    | Trans | Mean  | X     |
| PNCHRY    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 6.780  | 3.390    | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBBFA    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 17.000 | 8.480    | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBKF     | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 17.000 | 8.480    | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNBAP     | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 17.000 | 8.480    | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNPERY    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 17.000 | 8.480    | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNINP     | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 33.900 | 17.000   | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNDAHA    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 67.800 | 33.900   | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| PNGHIP    | 0                      | 0  | mg/d  | 0.000 | 0.000                        | 33.900 | 17.000   | 0.000  | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |
| TPAH      | 0                      | 0  | g/d   | 0.000 | 0.000                        | 54.200 | 54.200   | 54.200 | N/A           | 0.000 | 0.000                | N/A   | 0.000 | 0.000 |

## Summary of Mean Concentration and Total Loading Estimates

| Parameter Code | Units | Concentration Estimates |                     | Units | Loading Estimates |                     |
|----------------|-------|-------------------------|---------------------|-------|-------------------|---------------------|
|                |       | Mean                    | Confidence Interval |       | Mean              | Confidence Interval |
| PNCHRY         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNBBFA         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNBKF          | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNBAP          | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNPERY         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNINP          | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNDHAH         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| PNGHIP         | ug/L  | NC                      |                     | mg/d  | NC                |                     |
| TPAH           | ug/L  | 160.000#                |                     | g/d   | 54.20#            |                     |

NOTE: \* Regression estimate used, # Weighted Ave. method



[illegible]